

# D P N DESIGN PRODUCT NEWS

Covering the total design engineering function in Canada

  
March/April 2010



### Turbidity analyzers

Omega has announced CE compliant TRCN440 series turbidity analyzers are available in 3 NEMA 4X models. The TRCN441 is designed for medium to high turbidity ranges, the TRCN442 targets turbidity ranges from 10 to 100 NTU and TRCN443 is designed for below 10 NTU. [www.omega.ca](http://www.omega.ca)



### Electro-hydraulic switches

Bosch Rexroth Canada has introduced hydro-electric piston-type pressure switches rated up to 630 bar. Units are available for mounting on plates, for installing in pipe lines, with screw-in threads, and for use as sandwich elements in longitudinal arrangements. [www.boschrexroth.ca](http://www.boschrexroth.ca)



### 6-inch TFT touch panel

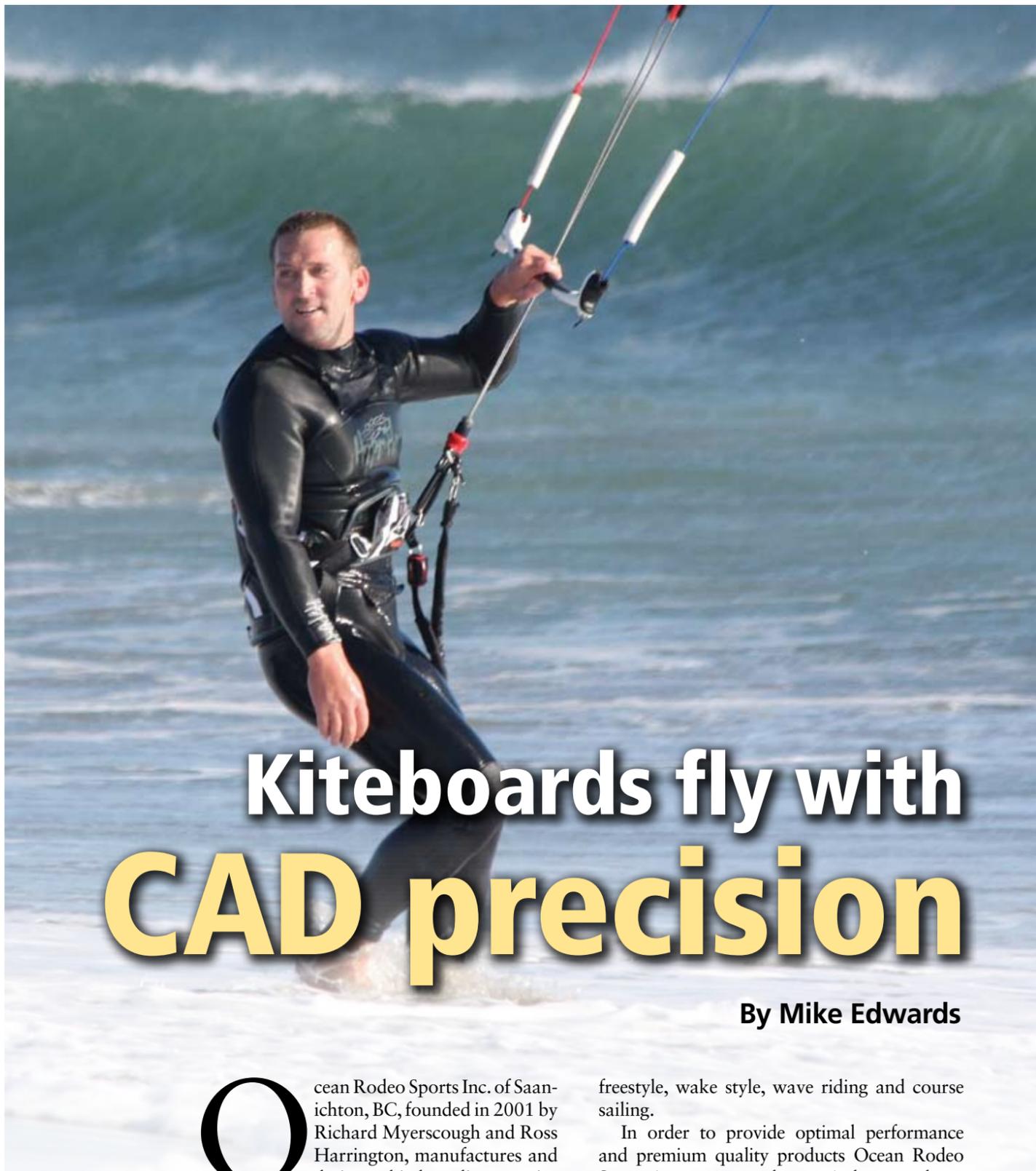
AutomationDirect has added a 6-in. TFT color touch screen HMI panel to its C-more micro line. The unit is equipped with a standard Type B USB programming port and five durable function keys with LED indicators, and offers 3.2 Mb memory. [www.automationdirect.com/C-more-micro](http://www.automationdirect.com/C-more-micro)

Volume 38 Number 2



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## Kiteboards fly with CAD precision

By Mike Edwards

**O**cean Rodeo Sports Inc. of Saanichton, BC, founded in 2001 by Richard Myerscough and Ross Harrington, manufactures and designs kiteboarding equipment, drysuits and clothing.

Kiteboarders use large kites to generate power to pull them on a board across water or snow. The kite control system is an arrangement of control elements that collectively act to allow the rider to launch, land, steer and affect the power of a kite. This is accomplished with a control bar, 4 or 5 flying lines and a "chicken loop" to which the rider is attached. As the kite's performance is largely defined by rider input, the control system is an integral part of the total kite setup.

Kiteboarding is quite a diverse sport: riders pursue winds of 20 to 70 km/h; they ride on a variety of water conditions including flat water, off shore choppy water, breaking waves or even snow covered fields; and, individual riding styles vary greatly both due to a variety of interests but also ability. In general kiteboarding currently has 5 disciplines; freeride,

freestyle, wake style, wave riding and course sailing.

In order to provide optimal performance and premium quality products Ocean Rodeo Sports ([www.oceanrodeo.com](http://www.oceanrodeo.com)) always seeks to innovate and improve its solutions. To design the new Ocean Rodeo 2010 Kite Control System Ocean Rodeo started a collaboration with Rudo Enserink, a multi-skilled computer-aided designer and founder of [enserinkdesign.com](http://enserinkdesign.com).

To design a totally renewed kite control system Enserink chose think3's CAD solution, ThinkDesign ([www.think3.com](http://www.think3.com)). Enserink has been working with ThinkDesign for over 10 years. He took the opportunity to build this new product in the later Beta-version of v2009.1 and contributed to the final release of ThinkDesign.

The kite control system is the arrangement of control elements that make the kite fly, sheet in and out, steer, launch, re-launch and land and incorporates a number of trimming and safety systems. As the kite performance is largely defined by rider input the control system is a truly integrated part of the total kite

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Note: Les pinces sont montrées à titre de référence avec les connecteurs encliquetables de thermocouple à montage sur panneau modèle SPJ-T-F, 4,50\$, vendus séparément.



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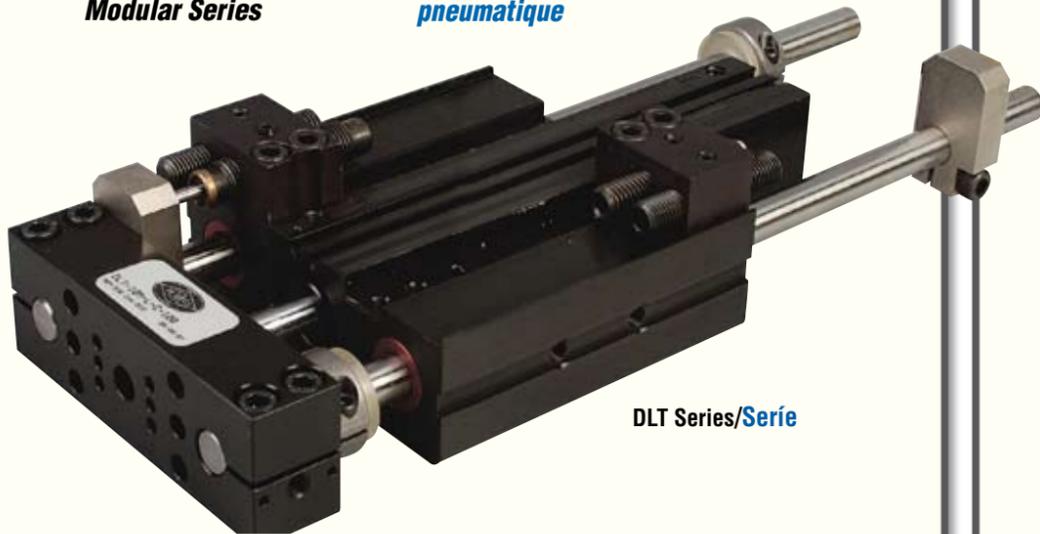
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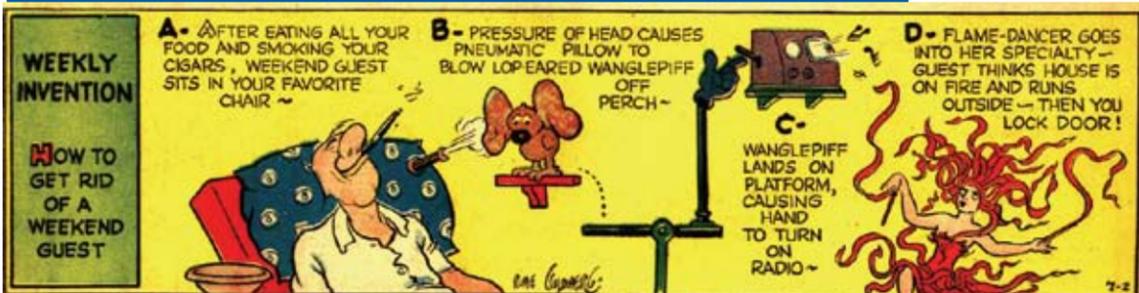


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\* The programming software is free when downloaded from the AutomationDirect Web site, or the CD-ROM package can be purchased for \$25 (part # EA-MG-PGMSW).

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# In this issue



## PTC puts "Conquering PLM" within reach of customers, the marketplace

Helping to drive PTC's PLM business has been the company's SharePoint strategy, according to Gregory Marin (above), SVP, PTC SharePoint Products Group. Marin told a Global Media Event that more than just engineers need access to design data.



## Canadian company provides isotope production alternative to Chalk River

Best Theratronics of Kanata, ON, provides cancer-fighting equipment such as its Equinox external beam therapy unit (above), as well as isotope-producing cyclotron equipment for hospitals, regional pharmacies and university research centres.



## Getting connected: a quick look at sensor interface alternatives

Given the wide range of applications that come under the heading "motion control," there is clearly no single best interface solution for all sensing problems to be solved by designers.



## Propylene-based elastomers improve the performance of polymers

ExxonMobil Chemical's Vistamaxx are being used as the carrier in masterbatch applications because they provide easy pigment dispersion and improved impact strength for high-end aesthetic applications.

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David Duncan (keyword IDWS) on styling for marketability
- Intellectual Property Blog**  
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# DPN DESIGN PRODUCT NEWS

## DIGITAL EDITION

March/April 2010



DPN editor  
Mike Edwards

Please go online to dpncanada.com to fully explore and enjoy the Digital Edition of Design Product News. This user-friendly new format, with every item linked to other websites, videos and 3D PDFs, will help you get even more invaluable design engineering information from **DPN**.



### Interactive stuff

Notice that as you move your mouse over certain parts of the magazine or over the DPN 3D and video player buttons, in some editorial stories and in some advertisements, a grey box appears. That means you are one click away from a new window opening up that takes you to a website or rich media we've linked to.

## Renderings



# The Great Recession destination begs the question, "Are We There Yet?"

By Mike Edwards, Editor

Gauging the worst economic climate since the Great Depression of the 1930s has become a cottage industry. Will the government stimulus plans around the globe actually work? Can Big Auto rebound? Will the Green Industry save us all?

So has the Great Recession bottomed out? For goodness sake, are we there yet?

Randy Breaux, vice-president, marketing at Baldor Electric Company and chair of the Manufacturer Council of the Power Transmission Distributors Association (PTDA) Board of Directors, has pondered the last question, studied the situation and has some advice for the power transmission and motion control industry. Over the last year Breaux has asked this same question over and over about the state of the recession.

He spelled out his thoughts in a recent PTDA *Transmissions* newsletter:

"While I make no claims to having the right answer to the question, I do believe we are there...if there is the bottom of one of the worst recessions since the Great Depression. In mid-2008, most of us were seeing record growth and wondering 'How we would keep up with demand?' But by the end of 2008, we were wondering, 'How did we get to this point so fast and how long will it last?'"

### We can learn and be better positioned in the future

"For most manufacturers in the power transmission industry, 2009 proved to be one of the quickest and worst declines ever experienced. And because so much of our business is dependent on the business from our distributor partners, we knew our distributors were hurting just as bad."

Unless you are fresh out of college, most of us are familiar with business ups and downs. But what are indicators telling us today?

"There are signs of calmer waters ahead. Most of us will look back and be amazed that we came through this, and all of us will agree that we never want to go through such a tough recession again."

"We all know that as business cycles go, we will see ups and downs in the future, but we just don't know the magnitude of the peaks and valleys. Knowing what we do, we can learn and be better positioned in the future to ride out these recessions and keep our companies strong and secure for many years to come."

Is it better to study success than to study failure, as one of Breaux's mentors once said? "I believe all of us have an opportunity to study what allowed us to come out of this recession with our heads above water."

To make your company be "stronger and more responsive in 2010, in an effort to help you win more orders," Breaux has some pointed advice: "I would really rec-

ommend each of us adopt an attitude of operating lean and mean, spending money in ways that add value to the services we provide our customers, not just spending it because we can.

"Invest in your business! All of us need to find ways to handle the increase in business that is on the horizon, without adding back the bureaucracy and layers of unnecessary management that we 'weeded out' during the recession. Do we really need to replace the clerk that we got rid of, even though we still can't figure out what he did when he was here?"

"Provide solutions to your customers or someone else will! Now is the time to solidify your company as the 'solution provider' to your customers. Many distributors and manufacturers have reduced their inside support staffs and outside sales engineers over the past year.

"End users have eliminated maintenance and operations people as well. Distributors that can provide the technical support that has been lost as well as offer solutions to improve productivity through product enhancements, process automation and technology upgrades will win

orders and become invaluable to their customers."

Breaux recommends positioning your company to take advantage of the growth to come in the next year or two. "Those that survive are the ones that are the very best at what they do! Be the best, as determined by your customers!"

If you found **Renderings** interesting, please send a message to [medwards@clbmedia.ca](mailto:medwards@clbmedia.ca).

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## By Design

# UOIT awarded \$2.6 million for electric vehicle research

OSHAWA, ON – Electric vehicle research at the University of Ontario Institute of Technology (UOIT) received a substantial financial boost, as Minister of Industry



Federal Industry Minister Tony Clement announced the Automotive Partnership Canada grant at UOIT.

Tony Clement announced a \$1.2-million investment to improve electric vehicles (EVs) with extended range capabilities as part of the Automotive Partnership Canada initiative. This is the first research project to be announced under the APC umbrella.

Funding for this project includes \$763,340 from the Natural Sciences and

Engineering Research Council (NSERC) and \$430,446 from the Canada Foundation for Innovation (CFI). Industry partner General Motors of Canada will also contribute \$1.4-million, which includes cash and in-kind assistance including material and resource expertise over the life of the project. The total combined contribution is more than \$2.6-million.

The funding, awarded to Dr. Greg Rohrauer, assistant professor with the Faculty of Engineering and Applied Science at UOIT ([www.uoit.ca](http://www.uoit.ca)) and his co-applicants, will facilitate research that will further improve the function of HVAC systems in EVs by advancing the thermal management system technology to extend vehicle travel range and provide longer lasting battery charge. Reducing the cost and improving the efficiency of the HVAC system will enable widespread commercialization of this technology.

Automotive Partnership Canada (APC) is a five-year, \$145-million initiative to support significant, collaborative, industry-driven research and development that benefits the Canadian automotive industry.

## Bosch Rexroth Canada at Safety Congress



Bosch Rexroth Canada ([www.boschrexroth.ca](http://www.boschrexroth.ca)) and partner Advanced Motion & Controls ([www.advancedmotion.com](http://www.advancedmotion.com)) are giving Canadian manufacturers a sneak peek at new technology designed to improve safety and lean productivity at the 2010 Machine Automation Safety Congress ([www.safermachines.com](http://www.safermachines.com)) May 3-4, 2010. The partnership is part of a special pavilion within the Industrial Accident Prevention Association's (IAPA) Health and Safety Canada tradeshow.

## News in Brief

### Ontario migration

Alberta-based Precismeca ([www.precismeca.ab.ca/](http://www.precismeca.ab.ca/)), a supplier of conveyor systems to the mining industry, is investing close to \$3 million to establish a manufacturing facility in Wallaceburg, ON. The company's \$3 million investment includes an \$894,000 loan from Ontario's Advanced Manufacturing Investment Strategy.

### Think3 sales network

Think3 ([www.think3.com](http://www.think3.com)), a global provider of CAD and PLM solutions based in Milan, Italy, has launched an international VAR organization for building, growing and supporting the indirect sales network worldwide.

### PTDA board member

Ajay Bajaj, president of Woodbridge, ON-based Rotator Products Ltd. ([www.rotatorproducts.com](http://www.rotatorproducts.com)) and a member of the DPN Editorial Advisory Board, has been elected to the board of directors of the Power Transmission Distributors Association ([www.ptda.org](http://www.ptda.org)).



### Bombardier flies away with major award

Bombardier Aerospace of Montreal was recently recognized as the Airframe OEM of the Year at the recent 2010 Frost & Sullivan Asia Pacific Aerospace & Defense Awards during the Singapore Air show. The F & S awards program recognizes best-in-class performers and their achievements in the areas such as general aviation, defense, homeland security, maintenance repair and overhaul (MRO), and aerospace manufacturing.

### Lenze-AC Tech announces Eric Klein as new director of sales

Lenze-AC Tech ([www.lenze-actech.com](http://www.lenze-actech.com)) has announced the promotion of Eric Klein to director of sales for Lenze-AC Tech motion control products in North, Central and South America. Company officials at Lenze-AC Tech are ramping up principal personnel in response to significant sales growth. Klein was previously the northeast regional sales director.



## Calendar

April 19-23, 2010. Hannover, Germany. Hannover Messe ([www.hannovermesse.de](http://www.hannovermesse.de)) includes co-located shows Industrial Automation, Digital Factory and MobilTec (hybrid and electric powertrains).

May 3-4, 2010. Toronto. For the third year running, the Partners in Prevention Ontario



PTC president and COO Jim Heppelmann calls 2010 the year "PTC becomes a PLM company."

## Conquering PLM, one license at a time

Last month PTC ([www.ptc.com](http://www.ptc.com)) hosted "Conquering PLM," a Global Media event at its headquarters in Needham, MA. It appears that Windchill PLM (product lifecycle management) and Pro/Engineer software developer PTC has taken a leadership position in the Product Lifecycle Management software arena.

According to PTC president and chief operating officer Jim Heppelmann, the company has earned 137% license growth over last year in its flagship Windchill PLM product in its fiscal first quarter and that the company is projecting US\$500 million in revenues for Windchill in its 2010 fiscal year, or 50% of its total revenues.

"This is the year that PTC becomes a PLM company," said Heppelmann. He added that in the CAD business mentality, many OEMs find switching platforms is too expensive, but that PLM is worth it when it comes to Windchill.

Helping to drive its PLM business has been the company's SharePoint-based

product strategy, according to Gregory Marin, SVP, PTC SharePoint Products Group. Windchill ProductPoint provides data management for small- and medium-sized business (SMBs) as well as extended enterprise PLM visibility. "For every engineer there are a dozen people that need access to design data," he said.

The company also highlighted its efforts in providing green product development leadership. Recent acquisition Planet Metrics carbon energy modeling and analytics tools will be integrated into its InSight environmental compliance platform. According to InSight VP Andrew Wertkin, "a more sustainable business is in line with a more profitable one."

Finally, PTC has announced its Application Lifecycle Management strategy for embedded software design. PTC plans to integrate open source tools such as Subversion, Bugzilla and Eclipse within Windchill to provide customers a solution that manages electrical, mechanical and software product development.



Jason Barzilay, chairman of Solido, made the announcement at SolidWorks World 2010 in Anaheim, CA.

### 3D desktop printer launched at SolidWorks World

Solido ([www.solido3d.com](http://www.solido3d.com)), a 3D printing company, launched a professional grade 3D desktop printer during SolidWorks World 2010. The SD300 Pro starts at US\$2,950 when purchased with the Platinum Value Pack Program, which includes modeling kits and accessories priced at US\$14,950. The 3D printer, sold through Javelin Technologies ([www.javelin-tech.com](http://www.javelin-tech.com)) in Canada, enables users to produce detailed, rigid prototypes at their workstations with accuracy within 0.004 in. Parts do not include any toxic chemicals, they alleviate the need for post build curing and parts can be drilled, finished and assembled to produce large models without outsourcing.

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Image courtesy of Engineering Center LTD, Russia

## Feature: Motion Control

# Getting Connected:

## A quick look at sensor interface alternatives

By Christian Fell

At the heart of any electronically-controlled motion control system are the communications interfaces that enable the exchange of information between the controllers, actuators and sensors that make up the system.

Several communications and networking technologies have become established as “industry standards” because they offer the right combination of features, performance and cost to meet the needs of particular applications and market segments.

Given the wide range of applications that come under heading “motion control,” there is clearly no single best solution for all problems. Industrial Ethernet offers advanced features that are extremely valuable to designers of large, complex factory systems. However, for smaller, more self-contained applications, simpler technolo-

gies such as fieldbus (CAN, PROFIBUS) or point-to-point wiring (SSI, Bit-Parallel, or even Analog) have a place. Thanks to standardized interfaces and networking protocols, system designers have many viable choices when they come to select components for their systems.

- Analog interfaces (voltage or current) can be cost effective for simple control systems. Using point-to-point wiring, they are easy to implement for small networks (1-5 sensors). Analog installations are common in applications like vehicles, medical equipment and energy management.

- SSI (Synchronous Serial Interface) and Bit-Parallel interfaces also use point-to-point wiring systems, but with a digital interface that connects directly to digital a PLC or microcontroller. Bit Parallel interfaces can provide very high-speed communications over short distances but require cables with individual wires for each bit. Fast SSI connections offer good speed



MAGNETOCODE rotary encoder with SAE J1939 interface is ideal for vehicle systems.

(clock rates up to 2 MHz), high resolution, flexible cabling and reliable communication over distances up to a few hundred metres (although longer distances mean lower baud rates). The SSI protocol provides basic error detection (broken wire, short circuit, data consistency).

Fieldbus networks were developed for vehicle, work cell and factory automation systems. Applications range from conveyors and manufacturing facilities to mobile

equipment, medical equipment, wind turbines and solar panels. These networks are based on a bus topology, which simplifies wiring for systems with a significant number of devices. They also support powerful diagnostic tools to help with system setup and troubleshooting. CAN (Controller Area Network) and PROFIBUS (Process Field Bus) were introduced by Bosch and Siemens respectively. The DeviceNet interface, developed by Allen-Bradley/Rockwell and commonly used in North America, combines the CAN physical layer with the CIP (Common Industrial Protocol) higher-level protocols.

Industrial Ethernet is a relatively recent development. While it shares core technology with “office” Ethernet, Industrial Ethernet systems incorporate special hardware and software aimed at providing “industrial-strength” ruggedness and performance. Examples include PROFINET, EtherNet/IP, and Ethernet Powerlink. Industrial Ethernet supports larger and more complex networks. It also enables seamless connections between the factory network (Industrial Ethernet) and the enterprise network (office Ethernet) which can simplify the integration of production, inventory control and enterprise management systems.

No single vendor can supply best-in-class equipment for every part of a complex automation system and leading suppliers of industrial networking technologies have supported the development of “open” (vendor-neutral) interface and networking standards. Thanks to these standards, buyers of motion control equipment can mix-and-match standards-certified components from different vendors with the expectation that everything will work together. Important industry standards organizations include the Open Device Vendors Association (ODVA, [www.odva.org](http://www.odva.org)), sponsors of DeviceNet and Ethernet/IP standards; the CAN in Automation Association (CiA, [www.can-cia.org](http://www.can-cia.org)), sponsors of the CANopen protocols; and the PROFIBUS Nutzerorganisation (PNO, [www.profinet.org](http://www.profinet.org)), sponsors of the PROFIBUS and PROFINET interfaces.

Vendor-neutral standards are extremely important to specialized equipment suppliers like FRABA, whose products have been designed to support a wide variety of standards-based communications interfaces.

Christian Fell is General Manager at FRABA Inc., Hamilton, NJ.  
[www.posital.com](http://www.posital.com)

## Cover Story

# Kite control system designed with ThinkDesign 3D CAD

From Front Page

setup. For the 2010 model year Enserink worked with Ocean Rodeo kite-designers on a totally renewed kite control system: the new requirements included improved ergonomics, wear resistance, reliability, comfort, styling and a good price.

“To get to the right shape for the bar I talked to many freestyle and wave riders and studied videos and photos of guys doing their amazing tricks. We have tested wood models for the different maneuvers and tricks riders perform and in addition to the forward thinking curved bar shape we also introduced the ‘horns’ located at the bar ends as an industry first.

“ThinkDesign allowed me to turn the concepts and shapes into 3D without compromising the design intent, quickly and cleanly. The bar is assembled from a forged alloy centerpiece with custom extruded bar ends and a PA6.6 end piece all covered in part sheet EVA and part dual density molded EVA.

“I chose think3’s CAD software,” stated Enserink, “for its integrated solid and surface approach and the proprietary 3D kernel. ThinkDesign is the best program for the demanding industrial designer, combining speed, power, precision, editability and a vast array of styling tools. One thing I really love from ThinkDesign is the flexibility to parameterize or not. Constraints can be helpful but can also be a pain: ThinkDesign offers many ways to switch back and forth between constrained designing and a more free creative style.”

He added, “Whether it was a swept fluent shape or a fastener, turning surfaces into skins or solids, keeping the relation to their creating curves intact, or deciding whether it is needed to make a local or x-ref component, it can all be done at any stage of the modeling process and allows you to speed through the many choices a designer needs to make”.

During the design cycle tentative designs changed into serious concepts with the help of many cool styling tools like GSM (think3’s Global Shape Modeling technology) and weighed curvature continuous fillets inside robust parametric modeling. ThinkDesign v2009.1 improved shading and live



The kite control system is the arrangement of control elements that make the kite fly, sheet in and out, steer, launch, re-launch and land and incorporates a number of trimming and safety systems.

cross-sections provided quick and effective collaboration between Enserink and Ocean Rodeo, allowing for simple screen shots of the model to be included inside e-mails.

“One of the features I find myself using a lot is the ‘connect curve’ with killer options like G2 or G3 to create the most stunning blends. Another set of features that I discovered were the ‘interactive modeling’ tools, they turned out to be true time savers for late design changes. Even though they lack the styling power of GSM they come in handy when minor details need fixing and they are fully integrated with the history tree,” added Enserink.

ThinkDesign kept playing a reliable role as ideas and changes were updated continuously throughout the process. With this new kite control system Ocean Rodeo Sports has managed to place itself on the front line of innovation one more time.

# Products: Motion Control

## Belt or ball screw actuator



Festo has announced the addition of the Electric Actuator EGC to its line of electro-mechanical actuators. The unit is designed for high dynamic speeds and high rigidity. This modular actuator can be used as an individual component adapted to third-party motors or as a complete system provided by the company. Options include: toothed belt or ball screw actuator; different screw pitches; sizes 70, 80, 120, 185 (ball screw); and sizes 50, 70, 80, 120, 185 (toothed belt).

[www.festo.ca](http://www.festo.ca)

## Floating shaft couplings



Zero-Max Floating Shaft CD Couplings with flex element are made from composite material provide zero-backlash, high torsion stiffness and low bearing loads and can be customized. Designs include torque ranges of 30 to 63,000 Nm; speed ranges of 500 to 15,000 rpm; and lengths of 46 to 196 in. with hub diameters of 2.25 to 12 in. Spacer material, custom material and hub options are also available.

[www.zero-max.com](http://www.zero-max.com)

## Linear measurement device



The POSITAL MDW compact linear measurement device from FRABA (46 x 46 x 70 mm or 1.8 x 2.2 x 2.8 in.) is available with either analog or digital interfaces. The unit combines a magnetic rotary encoder with a draw-wire mechanism, providing a range of up to 2 m at a resolution of 35 µm. The magnetic encoder uses a Hall effect sensor to measure angular displacements with no internal electrical contacts.

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

## Motor sensor drill



BEI Kimco Magnetics has developed a motor that meets the requirements for down hole measurement while drilling (MWD) application. The motor operates at winding temperatures of up to 220°C and pressures up to 30,000 psi. The motor measures 3.0 x 8.5 in., with a custom housing and dual shafts for gearbox and resolver mounting. Samarium-cobalt magnets aid operation and protect against corrosion. The motor positions a sensor to measure materials encountered during drilling.

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

## Galil video library



Galil Motion Control has launched a library of two minute videos demonstrating solutions to common motion and I/O problems. The videos are technical resources meant to prep busy engineers on their motion projects. Available videos include how to achieve a smooth multi-axis motion through arbitrary points and commonly used features of Galil's Accelera series motion controllers. Future videos will be added providing how-to explanations and demos.

[www.galilmc.com/learning/two-minute-videos.php](http://www.galilmc.com/learning/two-minute-videos.php)

## Roller pinion system



Nexen has released its Roller Pinion System (RPS) that features an ISO 9490 flange mount pinion and pinion preloader. With a low-friction design, the RPS consists of bearing-supported rollers that engage a tooth profile. The RPS converts from rotary to linear motion at speeds of 11 m/s. The system is available in standard segmented lengths or 1 m and 1/2 m increments and can be customized.

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

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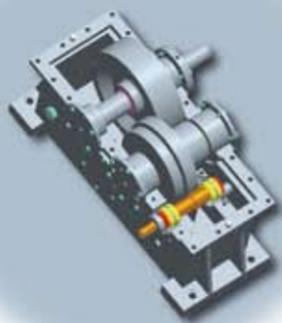
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# Spotlight

## Motion Control



### Specialty gearboxes

The **Cotta Transmission SN2057** now has selectable speed output capability for speed transmissions in test-stand applications. With speed capacities of 250 hp, 50,000 rpm maximum output speed and 6,000 rpm maximum input speed. Standard ratios are 8.5 and 11.96, with custom ratios available.

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

### Food & packaging modules

The multi-variant **MKR 20-80** linear module from Bosch Rexroth Canada is an individually configurable, ready-to-install product for applications involving intensive cleaning cycles, for example in applications associated with the food and packaging industries. The design features smooth, liquid-repellant surfaces.

[www.boschrexroth.ca](http://www.boschrexroth.ca)

### Internal encoder monitor

**Leine & Linde** has announced an integrated early warning system called **Advanced Diagnostic System (ADS)** in its 800 Series of rotary encoders. The system internally monitors the completeness of the rotary encoder pulses and correct pulse sequences. Errors are registered and recorded by the system, and can be analyzed.

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

### CAN-based controllers

**Axiomatic** has announced the release of an SAE J1939 or CANopen I/O control with 4 analog signal outputs. Other new models include a CAN to 1 analog signal output I/O control, and a 1 universal signal input to CAN I/O module. Applications include distributed controls for power generation, co-generation and stationary power.

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



### Design portfolio

**Rockwell Automation** has announced a mechatronic solutions portfolio profile that consists of software tools, motion control products and support. Features include an Updated Motion Analyzer software and Allen-Bradley RDD-Series, among others.

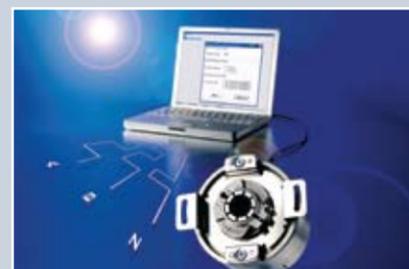
[www.rockwellautomation.com](http://www.rockwellautomation.com)



### Drive provides 27-bit resolution and autotuning function

**Kollmorgen** has introduced the Ethernet-based **Advanced Kollmorgen Drive (AKD)** for a range of applications that works with the Kollmorgen Automation Suite. It allows users to standardize on a single drive series with a common graphical user interface. Available for 120/240 Vac or 480 Vac operation, with a power range of 3 to 24  $A_{rms}$  continuous current and 9 to 48  $A_{rms}$  peak. With a 27-bit resolution, the drive measures 168 x 57 x 153 mm. An autotuning function automatically adjusts gains.

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



### Absolute encoders

**Sick Stegmann AFS60** Singleturn and **AFM60** multiturn absolute encoders allow users to configure programmable versions of the AFM/AFS60 via PC or laptop without an external voltage supply. Resolutions are up to 262,144 on the AFS60 and 4096 on the AFM60.

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

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## Automotive Scene

# Auto industry's renewed quest for lighter weight

By Bill Vance

Amid the hype over electric, hybrid and plug-in electric vehicles, another less glamorous but still important technical battle is taking place: the quest for lighter weight. Weight is the enemy of fuel economy, lower emissions, performance and handling, and once reduction is achieved it's permanent – there is no maintenance. Every 10% reduction in vehicle weight improves fuel economy 5 to 8%.

The last great push for lighter cars began in the 1970s, generated by the 1973 Arab oil embargo “energy crisis.” This resulted in U.S. legislation mandating sales weighted Corporate Average Fuel Economy (CAFE) for light vehicles of 18 mpgU.S. (13 L/100 km) in 1978, rising to 27.5 mpg (8.5 L/100 km) by 1985. The Canadian Government agreed on similar results. With the required lead time it took a few years for real weight change to occur, but when it did it was dramatic.

According to Troy, MI-based market researcher Ducker Worldwide, the average weight of 1976 North American passenger vehicles was 1841 kg. With “downsizing” led by General Motors beginning

**By 2004, vehicle weight was back to almost the 1976 average**



In the 1980s Audi began developing, in co-operation with Alcoa, its Audi Space Frame aluminum unitized body using cast, extruded and sheet aluminum.

with their 1977 large cars (the 1977 full size Chevrolet was 454 kg lighter than the 1976), average weight dropped to 1385 kg by 1982.

But “mass creep” resumed in 1986 as engineers were meeting CAFE with things like cleaner, more fuel-efficient six- and four-cylinder engines, front-wheel drive, unibodies and higher gear ratios. Some of the mass creep came from the sale of more vans and big SUVs, and some from adding better body crash protection and safety and convenience features like anti-lock brakes, multiple airbags, electronic vehicle stability, navigation systems and powerful “infotainment” packages. By 2004 the average was back to 1823 kg,

almost the 1976 figure.

The lightening quest has again intensified due to new CAFE legislation (similar results expected in Canada) rising from 27.5 mpgU.S. (8.3 L/100 km) in 2011 to 35.5 (6.6) in 2016.

Since Detroit-based auto manufacturers are financially pressed, Ontario-based component suppliers like Magna International of Aurora, Linamar Corp. of Guelph and Martinrea International of Brampton are taking leading roles in the search for lighter parts and more efficiency. Magna recently signed a \$7.2 million agreement with the National Research Council of Canada to establish a new research facility for lighter materials like thermoplastic composites. Martinrea is using methods like hot stamping and hydro-forming metals to make parts lighter. Linamar, in addition to researching

lighter parts, is working to improve the internal combustion engine.

Another contributor is aluminum, with projected use rising from 2% of vehicle weight in 1970 to over 10% by 2020, or 163 kg based on a projected curb weight of 1633 kg. The current leader is Audi who in the 1980s began developing, in co-operation with Alcoa, its “Audi Space Frame” aluminum unitized body using cast, extruded and sheet aluminum. It arrived in Canada in the 1997 Audi A8. The concept has expanded, with some high strength steel, to the Audi TT and R8, Bentley Arnage and Lamborghini, and will appear in the 2011 Audi A6. The space frame is claimed to be up to 150 kg lighter.

Not to be outdone, steel is responding with developments like advanced high-strength steel (AHSS) reinforced with martensite and boron. Parts can be smaller, thereby weighing up to 15% less than regular steel. Honda is emphasizing AHSS in its 2009 Insight hybrid, and generous amounts are in the Acura MDX, BMW X6 and Chevrolet/GMC crossovers.

And, of course, plastic is being widely used, and increasing in vehicle interiors and body panels. There is some 135 kg in the average North American car.

*Bill Vance is an automotive journalist and author.*

[www.billvanceautohistory.ca](http://www.billvanceautohistory.ca)

## Medical Engineering

# Our best hopes for isotopes

By Mark Sunderland

Last spring, an aging AECL reactor at Chalk River sprung a leak and was closed. This incident had a critical impact on the delivery of medical isotopes for treatment and diagnostics and it severely threatened the medical specialty known as “nuclear medicine.”

Following the successful treatment of a thyroid cancer patient in 1946, the use of nuclear medicine became wide spread and in the early 1950s its use increased to measure the function of the thyroid disease and the treatment of patients with hyperthyroidism.

The benefits of nuclear medicine have now reached far beyond the understanding of the thyroid – it has enabled the visualization of other organs including the liver and spleen, the location of brain tumors and studies of the gastrointestinal track. It is now also used in the diagnosis of heart disease.

Nuclear medicine is an integral part of patient care and extremely valuable in the early diagnosis, treatment and prevention of numerous medical conditions.

The kernel of nuclear medicine is the medical isotope, a very small quantity of radioactive substance that is used in a safe environment for imaging and treatment. Modern procedures enable medical isotopes to be delivered directly to the site of diseased cells, a process that is different from external beam radiation treatment in which radiation is directed from outside the body.

In diagnostic imaging, radioisotopes give off energy that can be detected by special equipment and when small quantities are introduced into the body, the imaging equipment tracks their location and movement. This enables doctors to

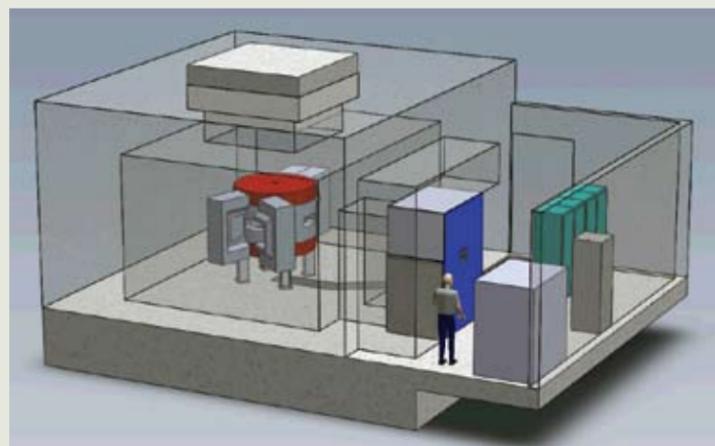
learn more about the diseased tissues than a procedure that only takes a picture from the outside. A medical isotope diagnostic procedure often complements and confirms an earlier diagnosis and leads to rapid and effective treatment.

Radioisotopes in cancer treatment are highly effective at zapping diseased cells because they can be delivered directly to the target and thereby eliminate the cancer cells while sparing the healthy tissues. They can also be directed to cancerous cells by a carrier that has an attraction to a certain part of the body. Chemical phosphonates, for example, can be paired with medical isotopes and sent to the bone because phosphonate is a natural building block of bone matrix. Medical isotope iodine is used for thyroid treatment because the isotope itself is naturally attracted to the thyroid.

So, a breakdown at the manufacturing plant – such as Chalk River – that produces such a vital component in medical care is nothing short of a catastrophe – don't expect to find an isotope maker in your local hardware store. The process is very costly, very dangerous and highly regulated. But, as we have often seen in the past, that when crisis strikes innovation prevails.

Medical isotopes are made in a machine called a cyclotron, a type of particle accelerator that uses electric fields to propel ions to high speeds and contain them in well-defined beams. An ordinary CRT television is a basic form of accelerator but, as the name implies, the motion within a cyclotron is circular.

Leading the way in medical isotope availability is Best



Best Theratronics is manufacturing cyclotrons that produce medical isotopes for nuclear medicine. The equipment (cyclotron vault shown) is helping to address the worldwide isotope shortage after the closure of Chalk River.

Theratronics Ltd. of Kanata, west of Ottawa, and its 140 employees cover expertise in manufacturing, engineering, design, radiation physics, dosimetry, worldwide logistics, sales, marketing and service. Best are makers of the BCSI Best 14p cyclotron system designed for optimum PET (positron emission tomography) imaging compound delivery in hospitals, regional pharmacies and university research centres.

Recently, the company announced plans to transform an existing cancer research facility at the Cancer Centre of Southeastern Ontario at Kingston General Hospital into a state-of-the-art cancer treatment centre and reduce the cost of cancer treatment. The new centre will be an ongoing collaboration that will advance both the research and clinical applications of nuclear medicine technology and further its vital contribution to medical health.

*Mark Sunderland is President of Ottawa-based BioMedical Industry Group (mark.sunderland@biomedgroup.com).*

**Products: Bearings**

**Agricultural Y-bearings**



SKF agricultural Y-bearing units are available in two models with a four year life span. The YELAG-Y bearings have an eccentric locking collar for normal applications and the YSOAG-Y bearings have SKF ConCentra concentric locking methods for applications where loads and speed are a factor. The bearings are relubrication-free, have a five-lip seal design with optional corrosion protection to protect against high-pressure wash downs and other sources of moisture.

[www.skf.com/agrisolutions](http://www.skf.com/agrisolutions)

**Low energy bearings**



DSM Engineering Plastics TW200F6 deep groove ball bearings from Stanyl are designed to lower energy consumption for light to normal load applications. The bearings are 30% glass fibre-reinforced PA46 grade and polyamide, with optimized internal geometry, low noise, low torque, long-lasting lubrication and a polymer cage design. Strength and creep resistance temperatures range from 150° to 220°C and crystallinity levels range from 70 to 80%.

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

**Spherical roller bearings**



Sealmaster USRB spherical roller bearings from Emerson have patented race mounted, felt lined flinger seals, unitized cartridge design, a high basic dynamic rating (BDR) and misalignment is ±2°. The bearings have setscrew lock bores sizes ranging from 1-1/8 to 7 in. and adapter lock bore sizes ranging from 1-1/8 to 7 in. The bearings are suitable for industries like primary metals, recycling and mining where conveyors, feed systems and stacking and blending are used.

[www.emerson-ept.com](http://www.emerson-ept.com)

**Right angle gear drives**



Zero-Max "Crown" gear drives are available in standard two- and three-way models with 1:1 and 2:1 speed ratios with shaft diameter combinations of 3/8, 1/2,

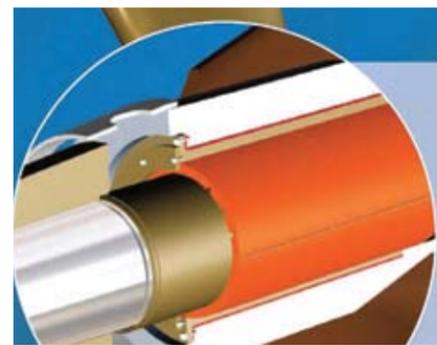
5/8 and 3/4 in. The drives have 10 spiral bevel gears permanently mounted to the shafts with locking pins and ground ball bearings for operation up to 200 rpm. Drives are pre-lubricated and enclosed in cast aluminum housings.

[www.zero-max.com](http://www.zero-max.com)

**Pollution-free shafts**

Thordon Bearings has announced its COMPAC propeller shaft bearing system. The bearings are enclosed in stern tubes for commercial newbuild vessels with shaft diameters of 300 mm or greater. The system includes non-metallic bearings, a Thordon Water Quality Package, shaft liners, Thor-Coat shaft coating and a forward seal. The company guarantees pollution reduction and to meet Classification

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Society wear specifications for 15 years or a new supply will be provided free of charge.

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



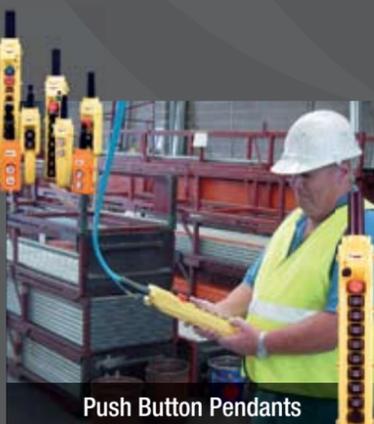
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## Feature: Engineered Materials

# Cladding technology controls pipeline corrosion

The 21st century has presented a technological shift in oil field drilling as most of the easily accessible oil is tapped and well producers are forced to go deeper to procure highly corrosive sour crude oil (H<sub>2</sub>S). Sour crude oil is a sulfurous mixture that corrodes the iron in the carbon steel pipe that extracts it and the petroleum industry has been determined to develop drilling technology that can overcome these corrosive effects to produce oil.

## Nook Industries ball screw assemblies key to patent-pending petroleum corrosion technology

In an effort to provide protection from pipeline failure and allow for oil production in new deep water sour oil fields, leading custom automated and robotic equipment manufacturer ARC Specialties, Inc. of Houston, TX, has developed a new cladding technology that controls this corrosion to safely extract and process sour crude.

The KLADARC advanced TriPulse Hot Wire Gas Tungsten Arc Welding (GTWA) system leverages oscillation welding to deposit a metallurgically lined (or clad) two-layer corrosion-resistant alloy (CRA/Alloy 625) overlay (nominal thickness of 3.5 mm and guaranteeing the 3.0 mm minimum thickness) on clad pipe up to 20 ft in length and inside diameters up to 30 in. Ultimately, this patent-pending technology reduces oxide inclusions and iron dilution in the cladding process – thus, mitigating the corrosive effects of H<sub>2</sub>S.

## Ball screws key to oscillation

Paramount to this 5-axis cladding machine's advancement is the capability to oscillate the arc inside the pipe.

This crucial element of oscillation in the process is driven by ball screws manufactured by Nook Industries (Cleveland, OH) Precision Screw Group as part of its Power-Trac line of precision ball screw assemblies. With over four decades of experience manufacturing precision ball screws, Nook's precision-rolled ball screw with a double bearing EZZE-MOUNT support provided a durable and efficient means of converting rotary motion to linear motion on the dual-torch oscillation axis (x & y) of the machine.

Ultimately, the dual-torch oscillation simultaneously overlays two layers of CRA onto the pipe's inner surface and provides a molten "puddle" with longer residence time to bond and eliminate common problems of overlay welding; i.e.-leaving holes that penetrate through the overlay layer and thereby expose the outer steel pipe to corrosive sour crude.

The dual-torch oscillation process involves feeding CRA wire into a 20 ft long torch that welds it circumferentially along the inner wall of the steel pipe. The circumferential weld is created by Nook's ball screws wiggling the torch into the pipe back and forth approximately 1" per second, while motorized pipe rollers steadily turn the pipe. The first 20 feet of pipe is coated, then flipped 180°, and then the torch is put back to coat other half of pipes' inside diameter.

Each oscillation places a heavy load on the ball screw with the 20 ft torch decelerated, stopped, and reversed 120 times a minute with loads running just under 1000 lb during acceleration. The accelerate/decelerate rate is a harsh and rapid speed/load oscillation of .8 in. at around 1 Hz per second. The oscillation process also moves the weld puddle side-by-side which generates approximately 2x the weld yield. Additionally, this single-pass circumferential weld ensures that the CRA overlay is seamless and also allows the pipe to undergo long-radius bending after the overlay process.

According to Dan Allford, President of ARC Specialties, "The oscillation process is a harsh application since it runs and repeats without stopping for hours at a time. Therefore, the reliability and performance of Nook's ball screws is vital and a key basis for our patent-pending process."

Nook provided ARC with its precision-rolled ball screws and ARC customized them to meet their unique



Above: Nook ball screw inside the oscillating slide. Right: Arc welding with oscillation creates overlay of wider stringer beads.

application specifications. Nook offers its ball screw assemblies in a wide range of materials including alloy, stainless steel, titanium, and other exotic metals. Nook's ball screws are available to meet a customer's application performance requirements; i.e.-stainless steel for medical, non-magnetic, non-corrosive applications. Nook also implements a precision rolled manufacturing process vs. grinding which is more efficient and cost effective.

A comprehensive Specification Data Sheets for Nook's Power-Trac Ball Screw Assemblies is available for download at: [www.nookindustries.com/ball/ballAssemblies.cfm](http://www.nookindustries.com/ball/ballAssemblies.cfm)

A myriad of forces continue to contribute to the need to develop advanced technology to battle sour crude petroleum pipeline corrosion including; demand, environmental concerns, energy independence, and aging infrastructure. For example, many of the sour crude oil reserves located in the Gulf of Mexico reside at very deep subsea locations that present volatile conditions such as high pressures which increase the oil's corrosivity – thus, making corrosion technology crucial to production. Corrosion technology also provides safety and protection from environmental



catastrophes resulting from corroded pipelines.

Currently ARC has produced two of its advanced TriPulse Hot Wire Gas Tungsten Arc Welding (GTWA) systems that are currently active in the Gulf Coast region - two more are scheduled for delivery in 2010.

According to Allford, "Oscillation welding really sets apart our clad quality from the traditional methods of cladding and produces a long-life coating that prevents pipeline failure. KLADARC's cladding technology controls the H<sub>2</sub>S corrosion, and trust in Nook's product to coat the pipe is directly related to this crucial feature which allows us to meet stringent Quality Assurance requirements for the Petroleum industry."

This article was contributed by Nook Industries.  
[www.nookindustries.com](http://www.nookindustries.com)

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# Exxonmobil Chemical's Vistamaxx enhances construction product performance

ExxonMobil Chemical's Vistamaxx propylene-based elastomers are being used to enhance the performance of a range of products for construction applications including roofing underlayment, roofing sheet and sound deadening.

The elastomers are being used in roofing underlayment products to make them safer and easier for contractors to install. Extrusion coating a blend of 10 to 70% Vistamaxx with polypropylene (PP) on to

## Improved performance of storage containers and boxes

the woven membrane on the upper part of synthetic roofing underlayment enables OEMs and converters to increase the coefficient of friction (COF), making the underlayment less slippery when contractors stand on it. And, by using Vistamaxx in the compound for the underside of the membrane, it helps prevent the underlayment from slipping off the roof during installation.

The elastomers are also being evaluated by OEMs and compounders in concentrations of 5 to 20% to modify thermoplastic polyolefin (TPO) formulations used for roofing sheeting. This provides improved flexibility of up to 33% for easier installation and repair, a broader welding window for improved welding performance and easier installation, and increased seam strength of 30% and peel strength of 17% for durability and long life.

Because of its high filler loading capability, which provides effective acoustic isolation, the elastomers are being used in sound deadening construction applications such as wall insulation. Compounded with over 70% fillers, Vistamaxx-based sound deadening solutions also provide excellent flexibility for ease of installation and improved functionality at competitive prices.

Vistamaxx propylene-based elastomers are also being used as a drop-in modifier to improve the performance of polymers used in storage containers and boxes. Vistamaxx is being used by OEMs and converters to add a range of



Vistamaxx propylene-based elastomers are being used as a drop-in modifier to improve the performance of polymers, such as this "living hinge" on a food container (above) and as a sound insulator in building construction panels (right).



ance of impact performance and transparency to eliminate breakage and maintain clarity, while a lower concentration than SEBS resin reduced costs.

A food container made from homopolymer polypropylene (hPP) lacked aesthetic appeal and the sealing performance required for a premium product range. RCP was originally evaluated as a possible replacement but the flexibility and low temperature performance did not meet the requirements of the application. By adding 5 to 10%

Vistamaxx to RCP, the modified compound provided a balance of: flexibility for an air-tight seal; transparency for superior appearance; low temperature performance to eliminate breakage; hinge flexibility without stress whitening or cracking; and, broad U.S. Food and Drug Administration (FDA) and European Union (EU) Directive approval for use in contact with food.

A DVD case made of RCP failed the drop test because it lacked impact strength and flexibility. Dry blending 10 to 30% Vistamaxx with RCP at the injection molding machine provided improved impact strength to minimize breakage, eliminated the need for mold modification or an increase in part thickness to maintain costs, and a living hinge and flexibility made it easier for children to open and close.

In addition, Vistamaxx propylene-based elastomers are being used as the carrier in masterbatch applications because they provide easy pigment dispersion and improved impact strength for high-end aesthetic applications.

Masterbatch compounding can be a demanding and technically sophisticated application requiring good dispersion, dilution and compatibility with the fabricator's resin. Failure to meet these requirements can result in finished products that exhibit poor mechanical and aesthetic properties. Vistamaxx meets these challenges.

The elastomers provide good colorability and temperature stability to reduce scrap and lower the cost of the finished product. It also has broad food regulation approval, allowing further market penetration into food contact/packaging applications.

The masterbatch can be compounded and pelletized using a single or twin-screw extruder. The lower melt temperature and viscosity of Vistamaxx facilitates wetting of the solid particulate filler and pigments for better dispersion.

A Vistamaxx concentration of between 20 to 30% is required for masterbatch applications, depending on the type of pigment and its surface area.

In order to improve impact strength and processability of recycled polymers, Vistamaxx propylene-based elastomers are being used by recycling companies to enhance the quality of their recycled polymer product.

Vistamaxx enables recyclers of polymers, such as polypropylene (PP) and polyethylene (PE) that are often from different sources, to achieve impact modification for a differentiated recycled product. It also enhances mixing for better quality products, improves processability of the finished part, and imparts consistency of performance in the recycled product.

Typically only 5 to 10% of Vistamaxx is needed to improve the impact strength and processability of the recycled product.

Vistamaxx is enabling companies to differentiate their recycled polymers by adding value. Companies recovering their own scrap can also benefit by adding the elastomer at the molding machine to help smooth out their process.

attributes such as enhanced flexibility, clarity and impact strength, and reduce or eliminate stress whitening.

One converter reduced cost and maintained performance of a transparent box previously made of polycarbonate (PC) by using 5 to 15% Vistamaxx in a random copolymer polypropylene (RCP). The modified RCP compound, which was dry blended at the injection molding machine, provided a balance of transparency for good appearance, impact performance to eliminate breakage, flexibility for good fit, and lower costs.

Wanting to reduce breakage of a clear, rigid storage totes during shipment, storage and handling, an OEM was looking for a more cost-effective impact modifier than the styrene-ethyl-butylene-styrene (SEBS) resin it was using. On evaluating a low density plastomer it provided adequate strength, but insufficient transparency, while a high density plastomer provided adequate transparency but not enough strength. Using 3 to 10% Vistamaxx, enabled the OEM to create the right bal-

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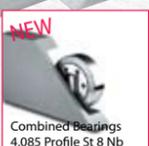
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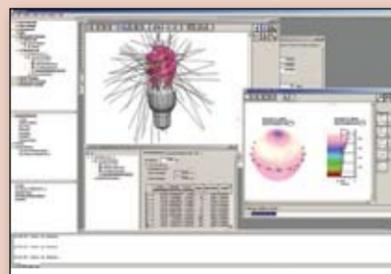
## CAD Chronicle

### Commercial 3D printer

Solido has introduced its SD300 Pro commercial 3D printer, suitable for different stages of production. The printer enables users to produce detail, rigid prototypes with accuracy within 0.004 in. Parts can be drilled, finished and assembled to produce larger models without outsourcing. Optically transparent models can be printed with flexible living hinges. [www.solid3d.com](http://www.solid3d.com)

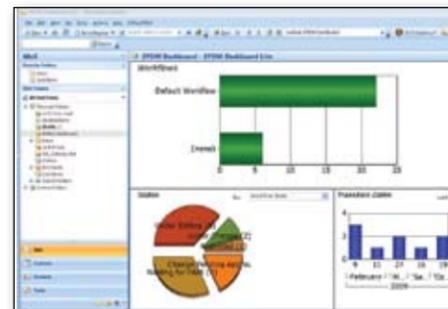


### Illumination design



Optical Research Associates has released LightTools 7.0 illumination design and analysis software for both model construction and system analysis. The software supports Windows 7 and enables users to create and import geometric objects from other CAD software. The ray tracing and analysis function has been upgraded for simulations. A "smart output" smoothing algorithm reduces statistical noise in calculations. Enhanced ray reporting identifies where energy losses occur in a model and LightTool's Solar Tracking Utility is included. [www.opticalres.com](http://www.opticalres.com)

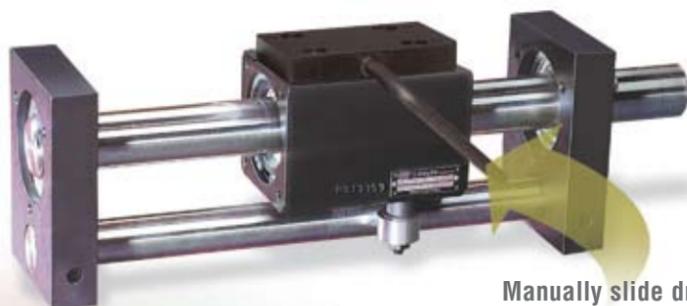
### Add-in hooks Microsoft applications in SolidWorks



Extensible CAD Technologies has announced Office2PDM, a software add-in that allows SolidWorks Enterprise PDM document management functions to work directly through Microsoft Word, Excel and PowerPoint programs. The software operates via an intuitive ribbon interface that enables users to update their status and revise through Microsoft applications. An EPDM dashboard embedded in Microsoft Outlook gives an overview of the PDM vault to review status, workflow, transition dates and tasks due. [www.office2pdm.com](http://www.office2pdm.com)

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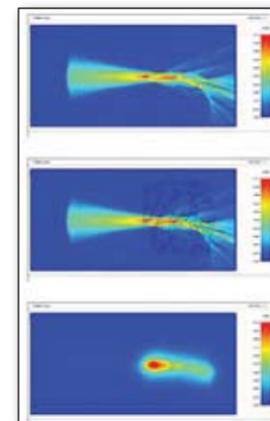
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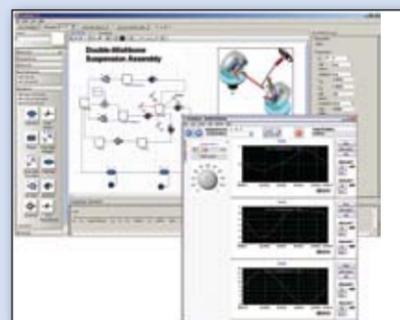
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### Virtual prototyping software

PZFlex has released an upgraded version of its PZFlex 2.3 for virtual prototyping software in commercial and academic uses. The upgrade includes a 64-bit environment to increase memory for inputting SolidWorks designs and flexible importation tools. Core computation module upgrades provide acoustic force radiation, shock heating, dielectric loss, volume calculation, model bending and geometric allocation with multiple drive functions. A calculator functions enables users to manipulate Flex histories and other ASCII data. [www.pzflex.com](http://www.pzflex.com)



### MapleSim extends to HIL



Maplesoft announced its MapleSim upgrade that will extend connectivity to hardware-in-the-loop (HIL) products from National Instruments like NI LabVIEW and NI VeriStand, programs for configuring real-time testing applications. The upgrade allows users to develop and optimize engineering system models, convert models to user-code blocks and perform high-speed real-time simulation. [www.maplesoft.com](http://www.maplesoft.com)

### Reverse engineering



Creaform launched its fourth version of VxScan software used for reverse engineering and quality control. The software enables data integration acquired from Handyscan 3D laser and HandyPROBE armless and portable CMM in both referential and real-time. Geometric objects can be created by scanning or probing data and saved in a format that allows for direct exporting into most reverse engineering and CAD software. [www.creaform3d.com](http://www.creaform3d.com)

## CAD Industry Watch

# SolidWorks World 2010: heads planted firmly in the cloud

By Bill Fane

SolidWorks World, the annual convention of Dassault Systèmes SolidWorks users, held in Anaheim, CA, last month left me wondering if I was at CAD convention or at a weather forecaster's convention. It seems that about every third sentence contained the word "cloud."

In case you haven't heard yet, "cloud computing" refers to a radical paradigm shift, wherein "The Cloud" refers to the huge cloud of computers that make up the internet. In this scenario, all your main applications and all of your data files will live on hosted servers.

### The more things change...the more the stay the same

Stop for a moment and think of the implications of this.

Right off the top it means that you will no longer need to buy powerful machines for high-end CAD and other graphics applications. Instead, the host servers can have, and will need to have, all the power and capacity.

If you have an internet connection and a web browser then you are in business. A low-cost netbook should work just fine.

This in turn means that you will no longer be tied to the Windows platform. In fact, they demonstrated SolidWorks ([www.solidworks.com](http://www.solidworks.com)) "running" on a Mac.

Next we come to the issue of software licensing. Running in the Cloud eliminates all the hassles of local installation and update procedures. SolidWorks also envision a dual mode; you could buy an unlimited, open license (much like the current stand-alone mode) and/or you could rent occasional time on a metered basis.

Cloud computing can have a big advantage during collaborative design projects. There will no longer be a need to email files back and forth and hope that everyone is working from the same revision level, because everyone will have access to the same single file on the Cloud. The next release of SolidWorks will contain the beginnings of this in that it will include Product Data Sharing (PDS). This will allow several users to simultaneously work collaboratively on the same file over the web, and it will also include automatic revision levels.

So far everything sounded all sweetness and light, so at a one-on-one interview with Jeff Ray, SolidWorks CEO, I played Devil's Advocate. My questions and his answers are paraphrased below:

**Q: What about data security? Will customers trust all of their proprietary data to a server "somewhere?"**

**A:** Your own PC is probably the least-secure place there is. Hackers can get in, viruses can corrupt, hard drives can go bad, your building can burn down, and your own employees can steal or do damage. We were a victim of this a few years back when an employee of a sub-contractor programming company walked out with a CD containing our source code. The FBI caught him in a sting operation when he attempted to sell it to a competitor. Where do

you keep your money, in a bank or under your mattress?

**Q: What effect will this have on third-part developers? How can they sell an add-on, if there is nothing to add on to?**

**A:** We are looking into having the third-party applications installed on our servers. As with the main applications you will either buy a full-time license or rent on a metered basis from the developer. We feel this will help the developers because it will potentially give them exposure to a much bigger market.

**Q: What about your resellers?**

**A:** We think they will be able to devote more time to selling and training because they won't have to be involved with all the hassles of supporting installation and upgrade processes.

SolidWorks executives repeatedly emphasized their commitment to Cloud computing, including Bernard Charlès, the Dassault Systèmes president and CEO attending his first SolidWorks World. Mind you, they were equally quick to point out that it is not their intention to shut down the traditional local-machine concept until virtually all users have voluntarily switched to the Cloud. They foresee running in parallel for a number of years.

I'm so old that I can remember when the only computers were big mainframes that held all our applications and data, and we accessed them through dumb terminals.

Most people don't realize that the P in



SolidWorks CEO Jeff Ray (right) and Dassault Systèmes president and CEO Bernard Charlès (2nd from right) on the SolidWorks World 2010 main stage rolled out a Factory Five all-electric hot rod.

PC stands for "Personal," and when they were introduced they were touted as freeing us from the tyranny of being tied to a central computer system. We seem to be coming full circle.

When discussing this subject with a friend, he said somewhat wistfully "Yes, I guess the Cloud is eventually going to rain on all of us." On the other hand, some rain isn't always bad. Just ask a farmer or the administrator of a municipal waterworks system.

With all the recent emphasis on virtual prototyping I was intrigued by the fact that about half the exhibits in the

vendor's showcase involved products for turning virtual parts into real ones. 3D printers were about as common as CNC programs.

Most of the remaining vendors were showing software add-ons, with very few hardware vendors. These days, most hardware that is good enough to run Windows is good enough for CAD. It's going to be interesting to see how the Cloud affects future shows.

*Bill Fane (bill\_fane@bcit.ca) is a software reviewer and retired mechanical engineering instructor at BCIT in Burnaby, BC.*

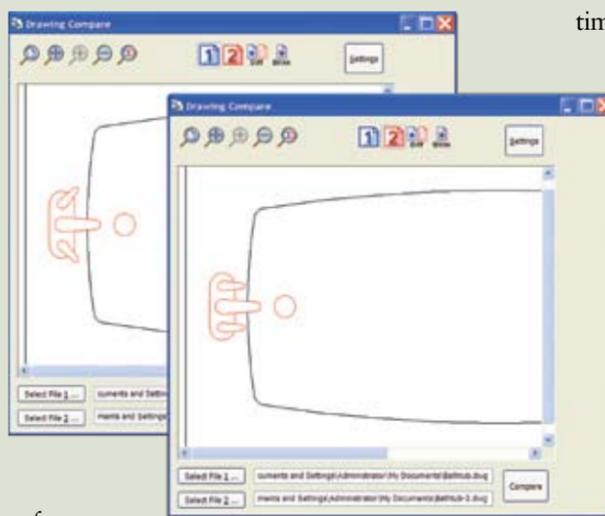
## DoubleCAD XT v2: IMSI/Design pays attention

It's nice to know that at least one person reads my reviews. Last year I reviewed DoubleCAD XT v1.1 from IMSI/Design, ([www.imsidesign.com](http://www.imsidesign.com)) which was touted as a work-alike, file-compatible, low-cost alternative to AutoCAD LT. I reported that it was certainly low cost (it's free), and that it was mostly file-compatible with AutoCAD 2009, but it didn't completely meet the work-alike claim. Apart from the fact that it didn't use a ribbon menu as per AutoCAD 2009, there were still a number of significant user-interface differences between DoubleCAD XT and AutoCAD.

Version 2 of DoubleCAD XT and XT Pro are now available, and by an amazing coincidence a number of significant items in the "What's New" list bear a remarkable similarity to my review comments. I could almost believe that someone had read my earlier review.

Probably the most significant improvements are the fact that the Esc, Spacebar and Enter keys now duplicate AutoCAD's actions, and the AutoCAD command aliases are already pre-configured. Keyboard junkies working by muscle memory can easily switch back and forth between programs.

DoubleCAD XT v2 also makes a significant change in how it starts up, in that the launch screen no longer forces itself to always be on top of everything else



**Although DoubleCAD XT Version 2 is free, the Pro version is only \$695. The upgrade could be worth it on the basis of one new feature alone; you can specify two different .2CD, DWG, or .BMP files and it will show you the differences between them.**

while the program loads. This is a common complaint that I have with many programs that affects productivity. Many programs today take so long to load that I often launch them and then switch to other work while they start up. A rude splash screen that forces itself to the top interferes with this process.

File locking has been improved, so that it works like AutoCAD both on peer-to-peer and server networks.

Unfortunately, I can't take credit for inspiring all the improvements in version 2. One such item appears when it is

time to plot a drawing. DoubleCAD XT v2 now consistently supports ACI (AutoCAD Color Index) values along with AutoCAD color table (.CTB) and plot style (.STB) definition files.

Conversely, a couple of my comments were not incorporated.

Specifically, the free DoubleCAD XT v2 still doesn't fully support XREFs. It will handle existing XREFs in a drawing from other sources, but you can't attach new ones. It looks like you can, but they end up being bound to the drawing and the external link is broken. On the other hand, the paid DoubleCAD XT Pro does offer full support.

In addition, the self-scaling annotative objects are still not supported because they feel there has not been enough adoption of them in the AutoCAD world yet.

Finally, they have not yet adopted a ribbon menu although there are many users who would claim that this is not necessarily a bad thing.

DoubleCAD XT v2 is still a free download from <http://www.doublecad.com/Download/tabid/1128/Default.aspx>, because they hope you will upgrade to the full-featured DoubleCAD XT Pro for only \$695.

The upgrade could be worth it on the basis of one new feature alone; you can specify two different .2CD, DWG, or .BMP files and it will show you the differences between them.

## Feature: Adhesives and Fasteners

# Finding the right adhesive for the job

By Martin Woollard

Adhesives aren't just the last resort for fixing broken things. It has been scientifically proven that under normal conditions a small quantity of adhesive will provide more strength than any mechanical fastener at a fraction of the cost.

When bonding metals, structural adhesives can provide strengths comparable to welding without any of the distortion or skill requirements. As an added benefit over welding, adhesives can almost always be used to join different materials such as plastics, rubber gaskets and different metals while accommodating differing rates of thermal expansion and insulating against

galvanic corrosion.

For example, a 316 Stainless Steel joint that might cost \$4 in material and labor to bolt together could be replaced with approximately fifteen cents of adhesive, while doubling the potential joint strength.

So assuming that adhesives can be used almost anywhere, why aren't they more common in OEM manufacture and repairs? The lack of a "universal" adhesive, leading to bad experiences is probably the biggest culprit, so being able to identify the different families of adhesives and what they do best is paramount.

Without a universal adhesive, it may appear that selecting an adhesive can quickly fall into an intimidating tangle of names and details. While some of the names can seem complex, there are only seven major chemistries (or families) to choose from. Each of these chemistries has a niche in which it excels and, once that niche is identified, the selection process becomes much simpler.

Here is a brief introduction to the various families of adhesive. These descriptions, coupled with a few criteria from the illustration above, should give you a fairly accurate idea of what adhesive technology would be appropriate for your application.

• **Epoxies:** Likely to be the most familiar adhesive to work with, this two-part adhesive was originally developed in the 1920s. It is still the strongest adhesive system, and the resin/hardener curing system gives it the best chemical resistance and an almost unlimited ability to cure thick profiles.

• **Cyanoacrylates:** Also called Instant Adhesive or Superglue, this product was discovered in the 1960s. Like epoxies, it has an incredible strength but it cures by reaction with the ambient moisture in the air. This limits the bond line to very close fitting parts but also makes it suitable for bonding almost any two surfaces.

• **Acrylics:** These adhesives are the most modern of the three structural types. While almost as strong in pure strength as epoxies and Cyanoacrylates, it represents a significant increase in toughness, able to survive repeated impacts that might shatter a more rigid adhesive. Testing has shown that joints bonded with acrylic adhesive will result in distorted steel or failed fiberglass before the adhesive will fail.

• **Hot melts:** These are the oldest of all adhesive technologies, dating back to the first time man stuck things together with a lump of warm tar. Fortunately technology has improved since then and hot melts are currently the most common adhesive used (by volume) due to the low cost and rapid curing (cooling). Although significantly weaker than epoxies or Cyanoacrylates, hot melt adhesives can still develop 300 pounds per square inch of surface area!

• **Elastomers:** This group of adhesives is used more for their elastic properties rather than their strength. There are four different groups of elastomers:

– **Silicones:** A high temperature elastomer, able to produce reasonably high strengths

– **Urethanes:** A high strength elastomer, but this adhesive is falling out of favour in many industries because it contains potentially harmful isocyanates.



Cyanoacrylates, aka Instant Adhesive or Superglue, are a product group discovered in the 1960s. Like epoxies, they have an incredible strength but cure by reaction with the ambient moisture in the air.

– **Modified silanes:** Despite its name, this elastomer is completely unrelated to silicone and is a non-toxic and paint able version of a urethane.

– **Flextec:** A very recently developed elastomer, it is similar in performance to a modified silane, but cures significantly faster.

• **Anaerobics:** These adhesives were initially used for bonding machine threads, as they cure in the absence of air and the presence of metal. Since their discovery in the 1950s they are used as a simple but effective way of securing two metal surfaces as well as sealing the gap between them.

• **Solvent Based Cements:** These adhesives cover a wide spectrum, but are all some type of volatile material (such as rubber) suspended in a solvent. Once applied, the solvent evaporates and the volatile material bonds the two surfaces. Many fast acting solvents are now banned in the workplace, making water the most popular solvent. However, the slow evaporation rate of water makes this an unattractive option for many processes.

### Joint design

The overall strength of a joint is directly proportional to the bonded area. While it is true that changing the width of the joint (perpendicular to the line of force) results in a linear increase in bond strength, this does not hold true for increasing the depth of the bonded area. The load distribution across the depth of the joint prevents any large gains in bond strength beyond a 1:1 ratio.

In addition to the surface area, the forces on a joint will greatly affect the strength. Adhesives have been proven to be very strong in tension, compression and shear, but can lose 90% of their strength on flexible joints where they can be peeled apart. In these cases, an elastomer is more appropriate, but these joints should be avoided whenever possible.

### Surface preparation

A common misconception is that adhesives require thorough cleaning and roughing prior to application in order to gain acceptable strength. While roughening will generally increase the bond strength due to the mechanical locking of the adhesive, any surface finish produced by machining or casting will be acceptable for bonding.

Of greater importance to bonding are surface treatments and coatings to adhesive performance. Since these barriers

are typically inert, their unresponsiveness can make them unsuitable for bonding. However, since the actual adhesives act as a barrier agent in most cases, it may be possible to eliminate the additional (and usually expensive) coating.

Cleaning of the surfaces prior to bonding is another process that creates much confusion. As a general rule, if contamination is significant enough that the adhesive will bond to it rather than the surface, then it should be cleaned. If an adhesive stops working in a production situation, there's a very good chance that contamination is an issue.

### Clamping time

Since the clamping force is generally low (usually a few pounds per square foot), the clamping time is usually a prime concern in an adhesive application. Generally, the window of assembling and clamping is determined by the cycle time of other parts of the process. As such, the handling time should be one of the prime considerations when selecting an adhesive.

As mentioned earlier, adhesive families usually have multiple curing mechanisms, such as moisture, heat, UV light or the presence of a separate activator. By selecting an adhesive from within the same family with a different curing mechanism, adhesives can adapt to any manufacturing situation with little or no loss in performance.

### The bottom line

Adhesives may seem overly complex to someone with no previous experience with them. However, many leading companies are turning to adhesives as their preferred method of attaching. High strength, versatility and lower costs are all common benefits to taking a new look at this technology.

Understanding the different adhesive chemistries, as well as the role of surface preparation and clamping, ensures that the adhesive selection process will result in the right tool for the job.

In some complex cases, choosing the adhesive that would provide the best performance, while integrating with the current manufacturing process, can be difficult. In these cases, turn to an adhesive supplier to help you select the best adhesive for your application.

This article was written by Martin Woollard., P.Eng., an Applications Engineer at Henkel Loctite Canada.  
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# Products: Adhesives and Fasteners

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

## Cost-efficient dowels

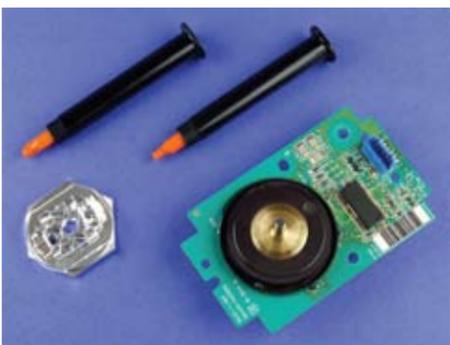


SPIROL series GD100 Ground Hollow dowels are designed to be a direct replacement for Ground Solid dowels manufac-

tured per ISO 8734 when used in alignment applications. They are manufactured from strip steel, and then OD ground to achieve diameter tolerances that enables alignment up to 20 µm. In most scenarios, the GD100 dowels are at least 30% less expensive and weigh approximately 50% less, the company says. The line is offered in four diameters: Ø8, Ø10, Ø12 and Ø16 mm.

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

## Temporary adhesive



Master Bond has announced that its UV14-3 UV cure adhesive offers vibration, shock, thermal cycling and thermal shock resistance. It is temporary and can be cured up to 1/8 in. deep. The adhesive has a Shore D hardness of 30 and an elongation of 150%. It features a volume resistivity of 1014 ohm-cm and a viscosity of 800 cps. It also features non-yellowing properties and a refractive index of 1.47. It has a service operating temperature range of -60°F to 250°F.

[www.masterbond.com/prodtype.html#puv](http://www.masterbond.com/prodtype.html#puv)

## Fasteners in variety of sizes



Chandler Products has recently acquired additional heading machinery enabling it to enter the 3/4 in. diameter fastener market. Chandler will now be able to offer headed and threaded 3/4 in. product up to 6 in. long in various head styles. Secondary operations such as pointing, shaving, trimming, grinding, drilling and CNC work are also available.

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

## Machinery acquisition expands capabilities



Leland Powell Fasteners has expanded its multi-station machine capabilities through the recent purchase of a 1/2" header. This acquisition enables Leland Powell to produce shoulder screws and oversized-head

fasteners in sizes from 8-32 (M4) up to 1/2-13 (M12), in lengths up to 5 in. (130 mm). The company produces machine screws, tapping screws and thread forming screws in steel and stainless steel, Grades 2, 5, and 8, as well as metric fasteners in Class 4.8, 5.8, 8.8, 9.8, and 10.9, for the lawn and garden, appliance and furniture industries.

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

## Hot melt applicators



PatternJet Plus hot melt dispensing applicators from Nordson are said to enable customers to apply a variety of adhesive spray patterns faster, more accurately, and with less material waste, increasing their productivity. An integrated applicator body and module with retract-on-close (snuff-back) actuators prevents adhesive stringing. The applicators are compatible with Nordson patented Universal nozzles. A user-friendly, practical design features quick-change cord sets with an integrated heater and sensor.

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

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## Products: Adhesives and Fasteners

### Slit type plastic couplings



Slit type plastic couplings from Sterling Instrument features low cost, UV resistance, voltage and RF isolation. The S50TLC Inch and Metric series are stocked in sizes 13, 19 and 25. The couplings are made of engineered polymer and have stainless steel fasteners. Units range in size from .125 to

.500 in. (from 3 to 12 mm) and range in length from .710 to 1.400 in. (18 to 36 mm). Maximum temperature range is -4° to 284°F (-20° to 140°C).

[www.sdp-si.com/eStore](http://www.sdp-si.com/eStore)

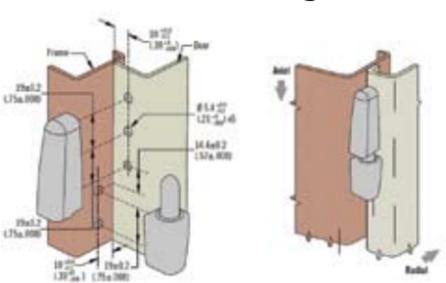
### Wireless torque wrench



The wireless fastener system from Mountz operates on an FM frequency. When a pre-set torque is reached, the wireless torque wrench sends an FM signal to the TALS Core monitoring device that records the fastener as fastened. After the readings have been recorded, easily download the readings and wrench data for SPC analysis and creating quality control documents. The flexible wireless torque wrench system is available in cam-over or break-over torque wrench models.

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

### Stainless lift-off hinges



The Southco 96 line of lift-off hinges now includes stainless steel and chrome plated finish options. The hinges provide increased loading capability and corrosion resistance suitable for installation in chemical processing, high heat, medical and outdoor environments. A non-lift-off mounting configuration allows for permanent installation, and a rear mount option conceals hardware for a professional appearance.

[www.southco.com/96](http://www.southco.com/96)

### Digital metal spot welder



The SonoWeld 1600 digital metal spot welder is available in 1500 and 2500 W power levels and is said to be effective in welding dissimilar metals to tabs or terminals. It accommodates copper, aluminum, nickel, and other non-ferrous materials. The resulting bonds are said to have greater electrical conductivity and weld strength than those created by conductive adhesives. In addition to lithium-ion and NiMH batteries, the welder can be used to assemble pouch cells and a variety of other terminal-joining operations.

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

### Concealed-head studs

PEM self-clinching concealed-head studs and standoffs install permanently in steel



or aluminum sheets as thin as 1.6 mm for a wide range of thin-metal assembly applications. They serve to satisfy applications where the sheet must remain completely sealed from air, liquid, dust and gases. The studs are available in thread sizes #4-40 through #10-32 and M3 through M5 and in lengths from .250 to 1 in. and 6 to 25 mm. Stainless steel standoffs are offered in thread sizes #4-40 through 1/4-20 and M3 through M6 and in lengths from .187 to 1 in. and 4 to 25 mm.

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

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## Technical Literature

**Thermoelectrics.** Laird Technologies has published its revised *Thermoelectric Handbook*. The handbook focuses on Thermoelectric Modules (TEMs) and provides in-depth insight into understanding the basic structure and function of TEMs, parameters required for device selection, assembly tips for mounting TEMs onto heat exchangers, and available temperature control options. Available only online, the handbook is accessible for downloading, viewing and printing.

[www.lairdtech.com/temhandbook/](http://www.lairdtech.com/temhandbook/)

**Vacuum power tools.** Dynabrade, Inc. has introduced a 64-page catalog describing its line of vacuum power tools and accessories. The use of the vacuum tools results in a cleaner, safer and healthier work environment.

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

**Electronics & lighting.** The Durel Division of Rogers Corp. has issued a six-page brochure, *Durable Electronics & Lighting Solutions*. The brochure provides a detailed overview of Rogers' capabilities in screen-printed electronics and associated services. User interfaces include durELplex multi-segment EL lamp and driver technology, and dur-E-sense piezo haptic driver technology.

[www.rogerscorp.com/durel](http://www.rogerscorp.com/durel)

**Gearing.** Power Transmission Solutions has introduced its consolidated gearing catalog. Product lines featured in the catalog include: Browning TorqTaper Plus shaft mounted reducers; Morse Raider Plus standard, washdown and stainless steel worm gear reducers (single and double reduction); Morse Cobra worm gear reducers; Morse PowerGear worm gear reducers; Browning IRA worm gear reducers; Browning ARA/HB/HSB bevel gear reducers; Morse M series bevel gear reducers; and, Emerson stainless steel and industrial c-face motors.

[www.emerson-ept.com](http://www.emerson-ept.com)

**Connectors.** Samtec has released its F-210 full line catalog with 393 pages of applications, specifications and ordering information on board-to-board, cable assembly and panel & I/O interconnect systems.

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

**Test & measurement.** Keithley Instruments has published its *2010 Test & Measurement Product Catalog* in CD form. The CD offers details and technical specs on Keithley's general-purpose and sensitive sourcing and measurement products, dc switching, RF/microwave switching, data acquisition and semiconductor test systems.

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

**Motion for packaging.** Thomson has available *Guide to Motion Solutions for Packaging Applications* that offers information on how to leverage motion technology to design and build optimized packaging and related material handling machines. Specific examples with detailed 3D application renderings include pick-and-place/palletizing, label printing/scanning, stretch wrapping, carton packing, PET bottle manufacturing and filling machines.

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

**Energy Management.** Overview brochure from Carlo Gavazzi, *Innovative for Energy Management*, covers a wide variety of applications and industries. Included are multi-function meters, power and quality analyzers, transducers, ac energy and utility meters, dc energy meters, software and accessories.

[www.gavazzionline.com/pdf/bruemeng.pdf](http://www.gavazzionline.com/pdf/bruemeng.pdf)

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**Feature: Power Transmission**

# Crowning: a cheap fix for noise reduction on gears

By Fred Young

Noisy gear trains have been a common problem for gear designers for a long time. With the demands for smaller gearboxes transmitting more power at higher rpm and incumbent demands for greater efficiency, gear engineers are always searching for new ways to reduce vibration and limit noise, without increasing costs.

Some popular solutions to the noisy gear problem include enlarging the pinion to reduce undercut, using Phenolic, Delrin or other noise-absorbing products, where possible, or changing to a helical gear train. Other methods include tightening specifications to insure greater gear quality or redesigning the acoustical absorption characteristics of the gearbox.

Occasionally, experimentation with gear ratios can limit harmonic frequency amplification, which otherwise can cause a gearbox to amplify noise like a finely tuned stereo system. The engineer can also study material and hardness requirements, so that modifications may be made to minimize heat treatment distortion or possibly eliminate the need for heat treatment entirely.

Particular attention must also be paid to gear geometry to insure maximum contact.

Another approach to the gear noise problem that yields good results is crowning or barreling of the teeth. This technique



The crowning configuration on a sample gear shaft.

involves changing the chordal thickness of the tooth along its axis. This modification eliminates end bearing by offering a contact bearing in the center of the gear.

A second benefit of the crowning approach to gear cutting is the minimization of misalignment problems, caused by inaccurate machining of the casting, housing, shafting, gearboxes or bearing journals. Crowning can also reduce lead problems in the gears themselves, which causes the gears to wear unevenly and bind because of eccentricities and position errors.

Crown shaving has long been a popular method, especially in manufacturing coarse pitch gears. With the recent evolution of gear equipment capable of crowning while cutting, the need for shaving just

to achieve a crown has been eliminated.

Two variations of the crown shaving method will produce a gear to compensate for off-lead or misalignment conditions.

One approach produces a crown by rocking the table during the reciprocation of work and cutter. The degree of crown is readily changed by this method. The other approach is plunge feeding, which requires dressing the shaving cutter to the desired crown. Generally, it is faster to plunge feed, but the technique can subject the cutter to greater wear. Of course, it is more difficult to change the crown, provided one starts with good quality gears. Shaving improves the quality of profile and reduces error in the gear tooth, through the cutting and burnishing action of the cutters.

The crown form can be produced on

gear teeth in several other ways. One method is to shape the gear by use of a crown cam in the shaper back-off mechanism. The proper radius of the gear is calculated by using the amount of crown on the flank and the pressure angle of the gear. Unfortunately, the blocks, while not complex, tend to be expensive.

The advent of the latest generation of gear equipment has made two methods of crowning while hobbing popular. Both methods produce crowns by increasing and decreasing the centre distance of cutter to workpiece. The first method utilizes physical copying of a template by a hydro-copying or mechanical following device. This allows taper hobbing or even the creation of sinusoidal wave forms, if desired. More recently, the second method, CNC hobbing, has become commonplace.

Depending on software limitations, CNC allows cutting gears in almost any desired form. A disadvantage to this approach is the high cost of the equipment, though the payback has decreased considerably, in recent years.

New CNC shapers can cut a crown gear or spline without the need for buying a special crowning cam.

*Fred Young (fyoung@forestcitygear.com) is the owner and CEO of Forest City Gear Co. in Roscoe, IL, and a leading authority on gear manufacturing.*  
[www.forestcitygear.com](http://www.forestcitygear.com)

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# Advisory Board Directions



## If the shoe does not fit must we change the foot?

By Ajay Bajaj

There is a Big Bad Wolf chasing us these days. It is called Change.

One theme which comes up frequently these days in Canada is how drastically things are changing around us everywhere in this recession. It could be either good or bad depending upon which side you are on, but remember that for centuries everyone has been lamenting that nothing remains the same. Empires have come and gone, civilizations have ebbed and flowed. Especially

since the industrial revolution the pace of change has intensified.

We all know change is constant and yes, we know all progress and improvement constitutes change. So why are we all so scared of change? Well Ellen Glasgow, the American writer, summed it up All change is not growth; as all movement is not forward. Truly a lot of people are a bit shell shocked having seen change thrust down their throats for the sake of change driven by plain old greed. This greed is barely disguised and often sugar-coated to make it more palatable.

You cannot blame workers for being suspicious when massive layoffs are announced in the name of shareholder value only to see management walk away with disproportionate amounts of money in the form of bonuses or options, while many of those same poor shareholders only see their stocks decline, and watch in dismay as their own jobs disappear. The situation reminds me of the old Chinese curse, "May you live in interesting times."

It is easy to forget that some of the change is inevitable. It will be less stressful, for example, to embrace it though

sometimes a pinch of salt or holding your nose may be necessary.

Let us embrace the sensible change and progress that comes with it. The world is round and the place which may seem like the end may also be the beginning.

Do you remember the fax machine? Yeah, that contraption that beeps in the corner sometimes. Ask the fax manufacturers how change to email and internet has affected them. Yet the same internet has created employment for millions, for IT workers, server manufacturers and web site developers.

The World Wide Web and email also produced a breed of modern malcontents who started producing computer viruses and computer worms that spawned giant companies like Symantec and Norton producing anti-virus software and employing brilliant minds worldwide. Are you not glad some people don't have a life?

The travel agents are struggling and going out of business as everyone uses

**Ask the fax manufacturers how the change to email and internet has affected them**

the internet, but this has generated hundreds of wildly successful travel sites like Expedia, Priceline and Hotwire, and made the process of booking flights, hotels and cars a breeze.

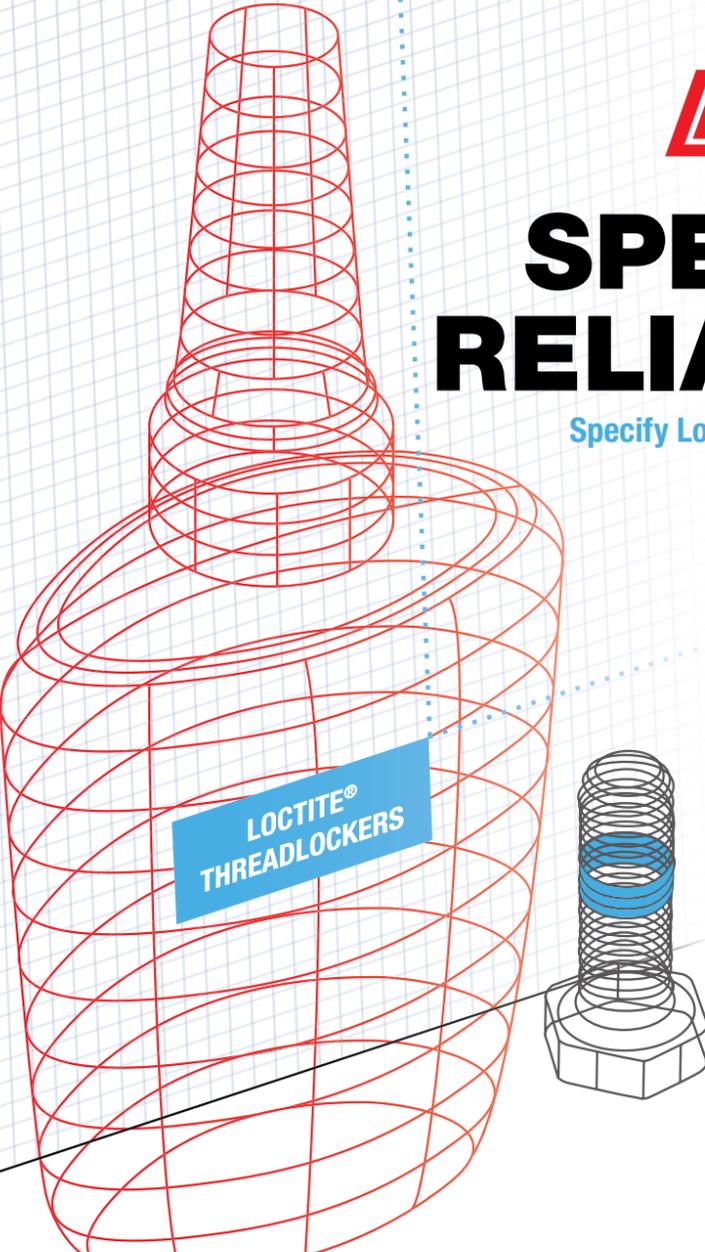
The landmark music shops like Sam's in Toronto disappeared as everyone downloads their music from the Net. A new generation will never know what it was like to go and linger in a music store and browse the records and CDs and sample the music. Yet along with a generation weaned on iPhones, iPods and Blackberries, a new music industry thriving on downloaded music was born.

The current economy has gone through a bitter transformation, lately for the worse. This begs the question, "is it just a matter of time that this recession too shall end and happy days may be back again?"

So come on, Canada, let us be proud and strong and rise to the occasion just as the nation did recently during winter Olympics and tackle this changing world head on, and triumph. It will not be easy. As poet Anatole France, born almost two centuries ago, said: All changes, even the most longed for, have their melancholy; for what we leave behind us is a part of ourselves; we must die to one life before we can enter another.

The most successful people are those who are good at plan B. Now be prepared but be wary, because The Future has a way of arriving unannounced, and please don't put that Prozac away yet.

Ajay Bajaj, P.Eng., is President of Rotator Products Ltd. ([rotatorproducts.com](http://rotatorproducts.com)), and board member of the Power Transmission Distributors' Association ([ptda.org](http://ptda.org)).



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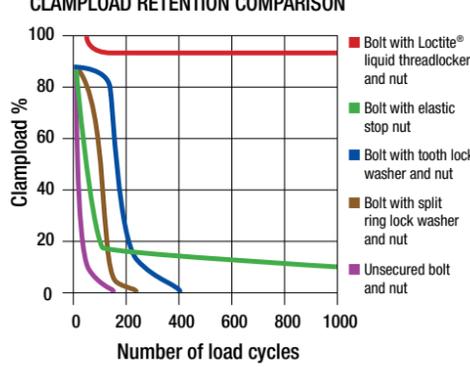
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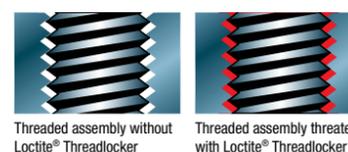
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| 200                   | 100  | 80                         | 20                                  | 10                                       | 0                      |
| 400                   | 100  | 80                         | 20                                  | 10                                       | 0                      |
| 600                   | 100  | 80                         | 20                                  | 10                                       | 0                      |
| 800                   | 100  | 80                         | 20                                  | 10                                       | 0                      |
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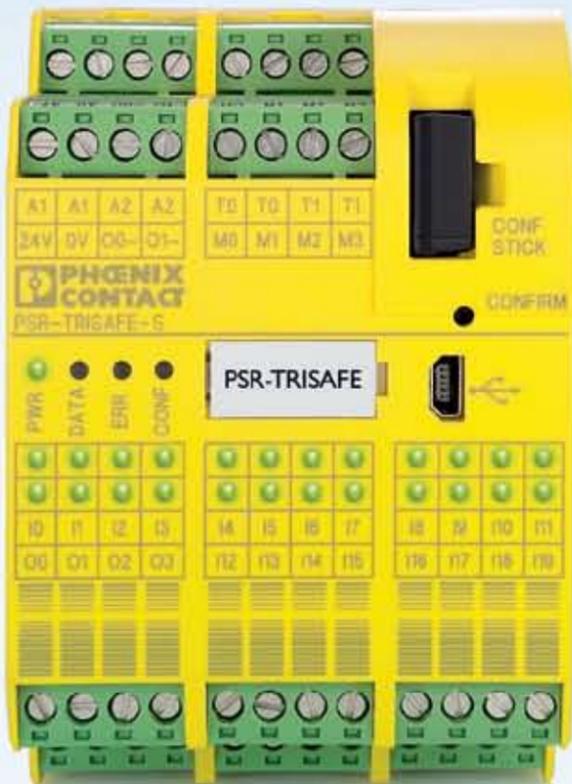
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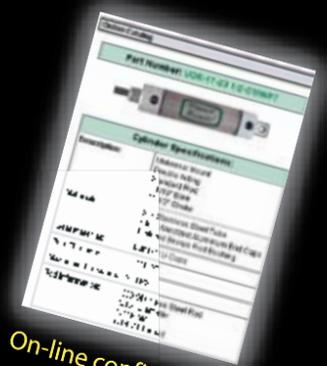


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