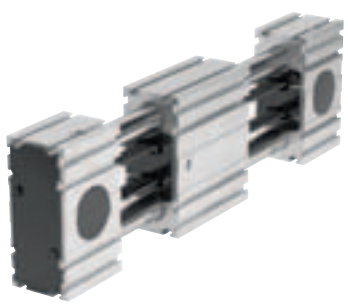
Prototyping materials make progress
Go to page 8

DPN DESIGN PRODUCT NEWS
Covering the total design engineering function in Canada
May 2010

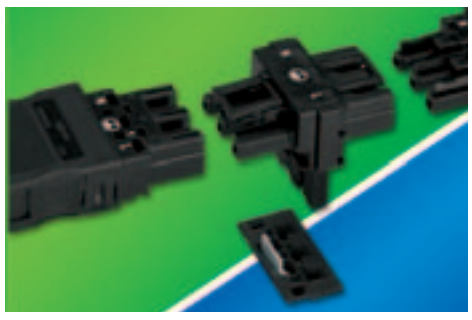
Safety controller monitor

The PSR-TRISAFE is a safety controller from Phoenix Contact. The 67.5 mm safety controller can monitor up to 20 safety input signals such as up to 10 dual contact emergency stops.
www.phoenixcontact.ca/trisafet



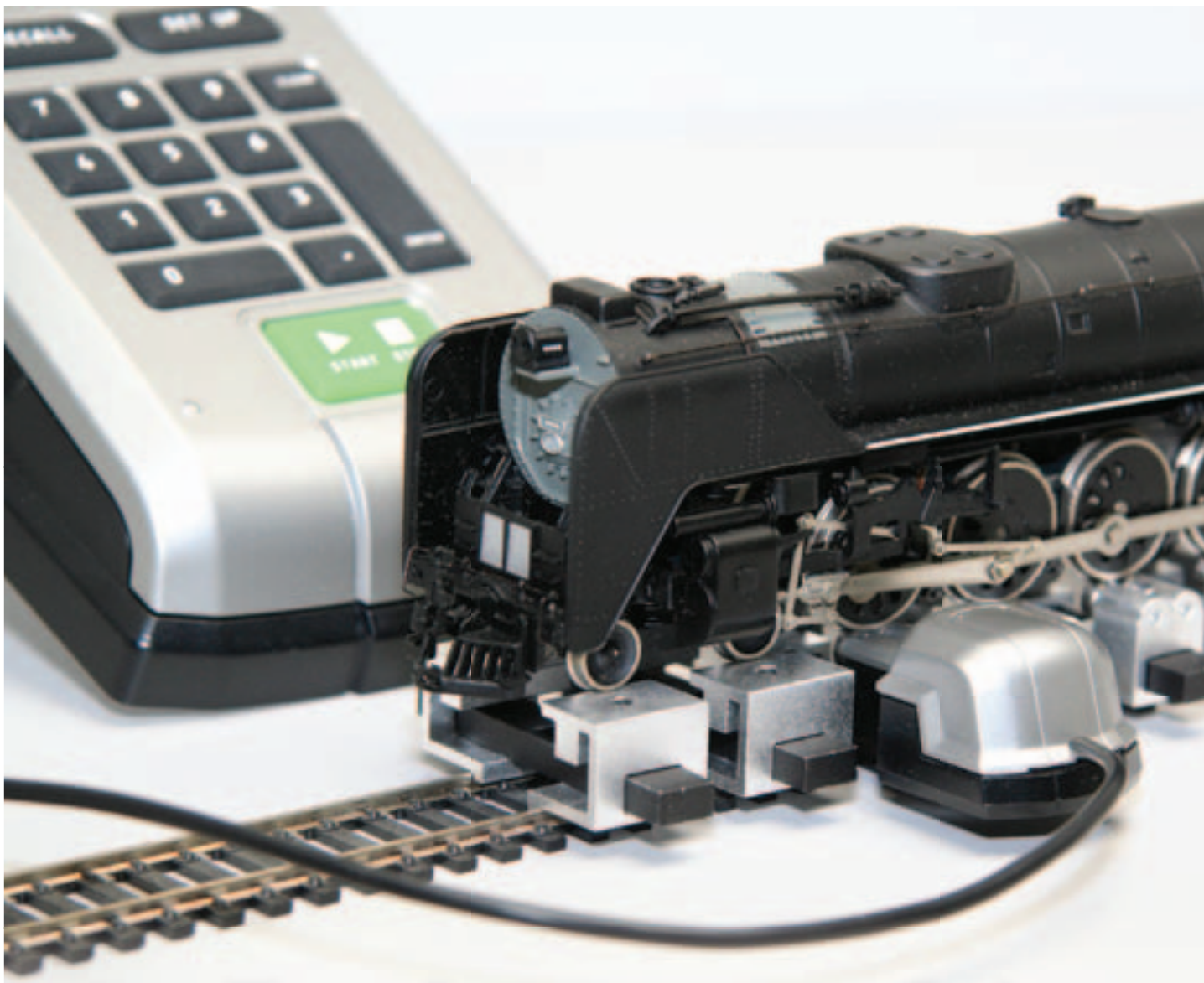
Toothed belt axis

The ELGR toothed belt axis from Festo is available in 3 sizes with strokes of up to 1.5 m, a speed of 3 m/s and a repetition accuracy of ±0.1 mm. Units have a service life of 5000 km and deliver feed forces up 350 N.
www.festo.ca



Hot swap connectors

WAGO Corp. has introduced 770 series WINSTA MIDI and 890 series MINI Pluggable Connectors that are UL-recognized 600 V devices for disconnection under load. The MINI is rated at 5 A/600 V; the MIDI is rated up to 10 A/600 V.
www.wago.us



Styling keeps model trains appeal on track

Edited by Mike Edwards

Hobbyists have been collecting model trains from the age of steam engines and streamliners right up to today's diesel-electrics, always with a respect for mechanical functionality.

Bachrus Inc. (www.bachrus.com) makes rolling stands, a standalone unit of bearings allows model train wheels to move in motion while stationary. These are called saddles, and the saddles sit directly underneath each axle of the train engine to allow the low voltage current from the track to pass through into the train. The system is great for people that do not have the room for track layouts.

When Bachrus wanted to create an accessory to its rolling stand it came to the St. Catharines, ON-based industrial design firm IDWS Inc. (www.idws.ca) to create a system to read the rotation of the bearings and translate that into a scale speedometer speed – in a unit that would appeal to hobbyists.

Should the design begin from the inside out or from the outside in?

"We were designing our enclosure to suit trains and the people who like to collect them, and so we chose to design from the outside in," according to IDWS president David Duncan.

"Considering the customer demographics, we began looking at the style and ergonomics that might be required first and then the functional process of engineering the parts to follow."

Certainly some of Duncan's concerns were how he was going to get the data from the wheels and into an enclosure. "But for us the bigger issue was marketing, could we create a visual aspect for the sale-ability of the product?

"And so we really wanted to re-create who this customer was and what might help motivate them to purchase such a product. So we started to create image maps of different trains and train eras, looking back to steam locomotives and a streamlined locomotives that find favor in collectors eyes."

IDWS focused in on the heyday styling from the 1930s of the streamlined era, the smooth lines and curves of an aerodynamic shape that

Continued on page 9

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PM# 40063602
PAP Registration No. 10773

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Grippers pneumatic precision parallel movement DPP DirectConnect™ Serie

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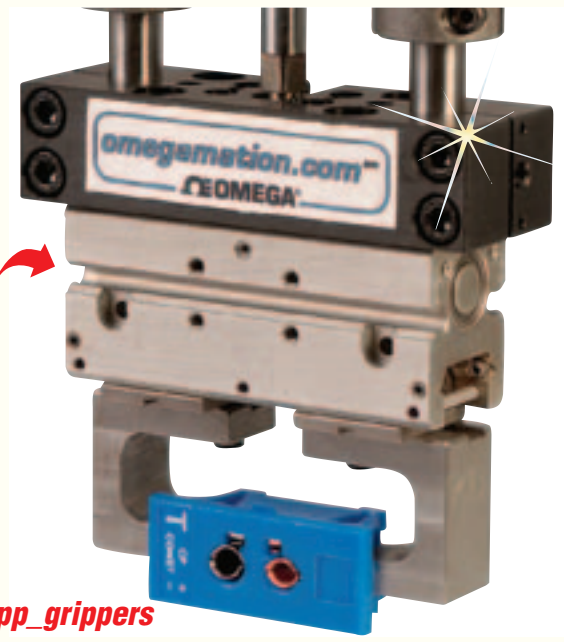


DPP Series/Serie

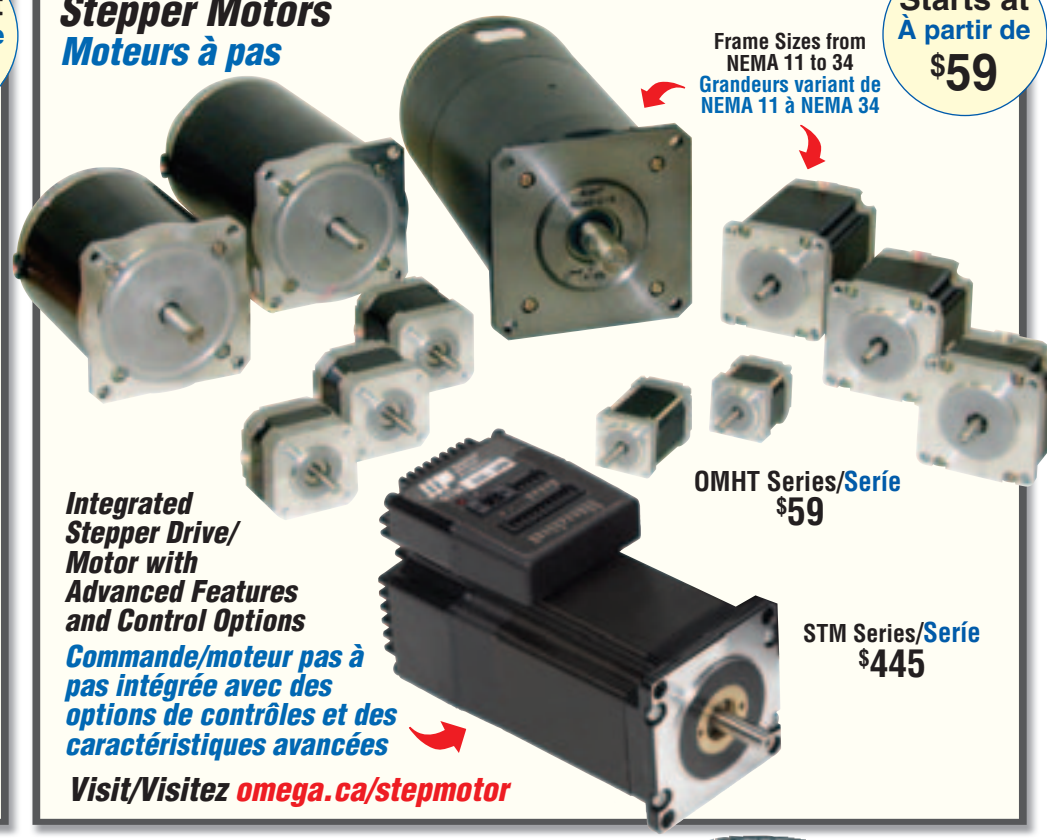
Note: gripper fingers are shown for reference purposes with SPJ-T-F snap-in panel jack thermocouple connector, $4.50, sold separately,

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.

Visit/Visitez omega.ca/dpp_grippers

Stepper Motors
Moteurs à pas

Starts at / À partir de $59



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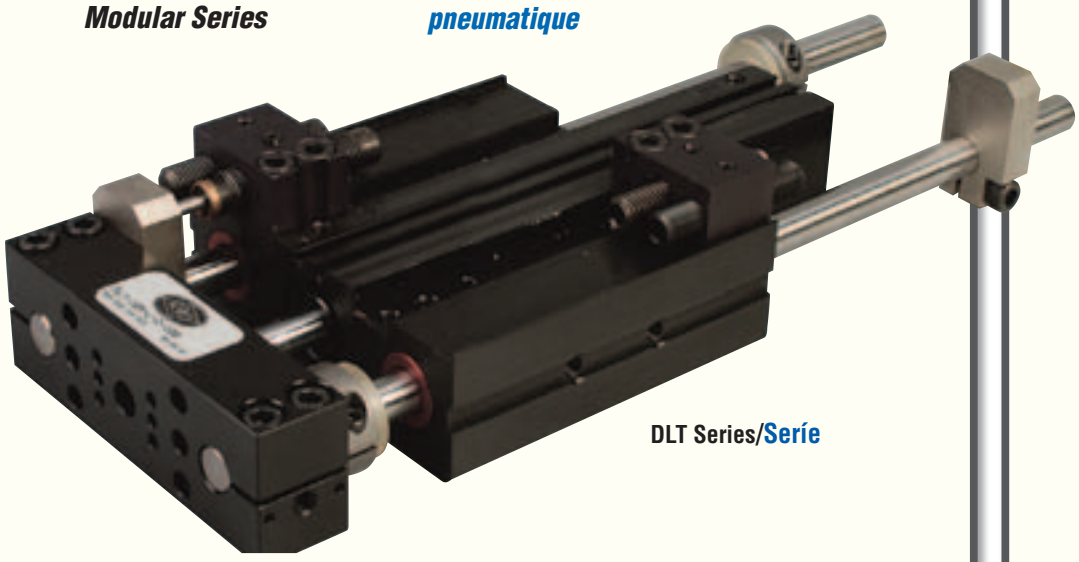

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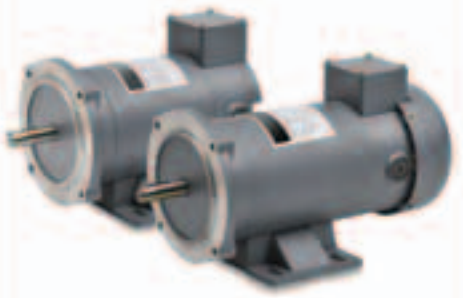

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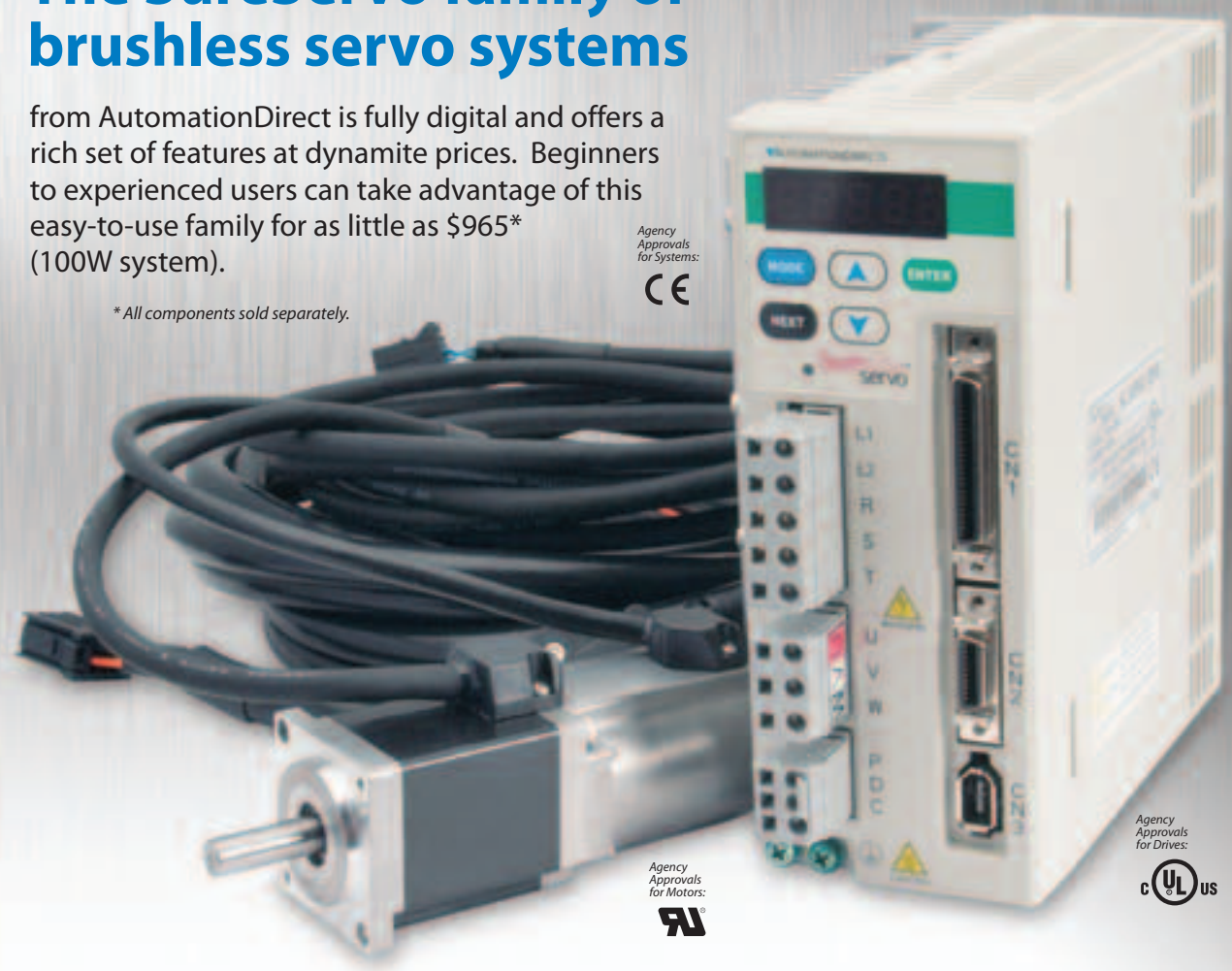
The SureServo family of brushless servo systems

from AutomationDirect is fully digital and offers a rich set of features at dynamite prices. Beginners to experienced users can take advantage of this easy-to-use family for as little as $965* (100W system).

** All components sold separately.*

Agency Approvals for Systems: CE



Agency Approvals for Motors:

Agency Approvals for Drives: c UL us

SureServo drives accept a wide range of command sources:

- Built-in motion controller with preset position, velocity or torque select presets with switch inputs and/or the multi-drop Modbus serial interface
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CHECK OUT OUR PRICES — *Note: All components sold separately.*

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Digital Servo Drive	$479.00 SVA-2040		$970.00 2098-DSD-005
100W Servo Motor with connectorized Leads	$319.00 SVL-201		$972.00 Y-1003-2-H00AA
Breakout Board Kit for CN1 Control Interface	$89.00 ASD-BM-50A		$195.00 2090-U3BK-D4401
10' Motor Feedback Cable	$49.00 SVC-EFL-010		$141.00 2090-UXNFBY-S03
10' Motor Power Cable	$29.00 SVC-PFL-010		$82.00 2090-XXNPY-16S03
Configuration Software	FREE SV-PRO*		$75.00 2098-UWCPRG
Complete 1-axis 100W System	$965.00		$2,435.00

*SureServo Pro software is FREE when downloaded and is also available for $9 on a CD

All prices are U.S. list prices, AutomationDirect prices are March 2010 prices. The Allen-Bradley 100W system consists of part numbers shown in table above with prices from http://shop.rockwellautomation.com 9/18/09.

For configuration, tuning and diagnostics, use the drive's integrated keypad/display or take advantage of the free *Sure*Servo Pro™ PC-based software.

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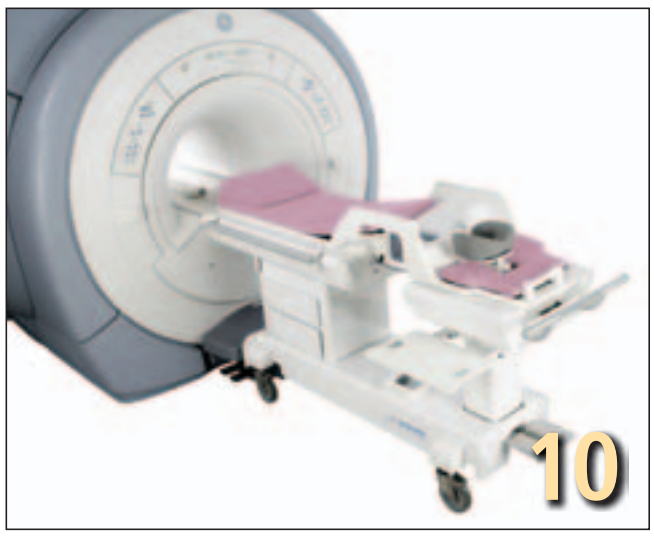
In this issue

Festo Regional Contact Center open for business at Canadian headquarters

Mississauga, ON, mayor Hazel McCallion (above) applauded Festo for amalgamating the company's U.S. and Canadian customer contact centres in her city and for its commitment to technical innovation.

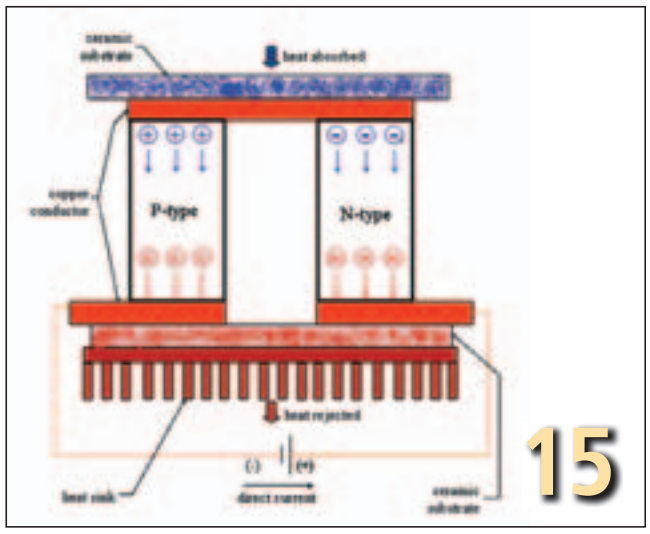
Rapid prototyping materials encroach on finished products applications

Additive manufacturing technology with new advanced materials that provide enhanced performance capabilities means that RP has gone beyond just providing conceptual models and functional prototypes.



Equipment design sets the patient table for early breast cancer detection

Ontario manufacturer makes life easier for patients having breast examinations, adding specially designed table top coils, integrated patient stretchers, tables and intervention software to MRI scanners.



Thermoelectric coolers provide an alternative to traditional methods

Passing electric current through two dissimilar metals to create hot and cold is known as the Peltier Effect. Rittal has developed a system with semiconductor materials that controls the effect for industrial cooling.

DEPARTMENTS:

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Electronic/electrical component distibutor Electro Sonic sets up U.S. shop

New NSK general manager Michael St. Jacques to expand Canadian operations

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Industrial Design Blog
David Duncan on how Ford understands Qualitative Design

Intellectual Property Blog
Charles Boulakia on how to protect your design in the marketplace

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DPN DESIGN PRODUCT NEWS

DIGITAL EDITION

May 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

Survey shows mechanical engineers expect increase in sustainable design work

By Mike Edwards, Editor

Developing products with an eye towards ecological sustainability is a concern for designers around the globe. But to what degree are manufacturers using sustainability as a design criterion?

Results from the second annual Sustainable Design Trend Watch Survey, jointly commissioned by the American Society of Mechanical Engineers (ASME) and Autodesk, Inc., indicate that mechanical engineers expect to see an increase in sustainable design work in 2010.

Despite the challenging economy, respondents indicate with a 6% increase over last year that they believe sustainable design will be further incorporated into their work in 2010. The survey also reported for the second consecutive year that more than two-thirds of participating mechanical engineers have worked on sustainable products, and more than half of ASME student members are involved with sustainable design in their studies.

ASME and Autodesk industry survey of sustainable design trends

The survey is conducted to understand the effects of sustainable design on mechanical engineers and their manufacturing businesses in industries ranging from aerospace and automotive to energy and transportation. According to survey results, designs that use less energy or reduce emissions remain the most important sustainable technology practice, while manufacturing processes that use less energy and natural resources were also a priority.

"The results of this important ASME-Autodesk survey demonstrate that sustainable design practices are exerting a positive influence on the mindset of engineers at all levels," said Thomas Loughlin, executive director of ASME. "Going forward, engineers will be at the forefront in creating sustainable technologies that produce large-scale impacts worldwide."

"There is no question that sustainable design is a priority for mechanical engineers, and Autodesk collaborates with ASME on this survey to highlight the importance of making smarter, more sustainable design decisions at every step of the design process," said Robert "Buzz" Kross, senior vice president, Manufacturing Industry Group at Autodesk.

One example of a manufacturer incorporating sustainable design practices is Ohio-based Unverferth Manufacturing Company, Inc. Unverferth is a leading, family-owned manufacturer of agricultural and farming equipment, including a full line of tillage products.

Using digital, or virual prototyping, Unverferth has decreased the number of physical prototypes it builds by 75%. In doing so, the company decreased materials usage for prototypes from 230 to 60 metric tons annually. In addition, Unverferth has reduced product weight by 5% through more efficient use of materials.

The survey indicates that top drivers of sustainable design practices within organizations include regulatory requirements, rising energy costs and client demand.

Along with creating designs that use less energy and reduce emissions, respondents indicated that priorities include improving manufacturing processes to use fewer resources; using renewable, recyclable and recycled materials; and reducing material waste in manufacturing.

Similar to last year, respondents again indicated that cost is a major consideration, with one-third of respondents reporting they would consider sustainable technologies for new products only if they are cost saving.

The online surveys of more than 53,000 ASME professionals and nearly 20,000 ASME student members were conducted over a two-week period that concluded in November 2009.

As a designer, are you being mandated to introduce sustainable elements into new products or machines on projects coming your way? I'd be interested in hearing from you and sharing your challenges with the *DPN* magazine and online audiences.

For more information on sustainability at Autodesk, visit www.autodesk.com/green or www.autodesk.com/sustainabilityreport.

If you found **Renderings** interesting, please send a message to medwards@clbmedia.ca.

By Design

Electro Sonic expands to Buffalo Niagara region

Canada-based national electronics and electrical components distributor, **Electro Sonic of America LLC** (www.e-sonic.com), has announced a $20 million expansion that includes a new and highly automated electronic distribution center in the Buffalo Niagara region.

Joel Rosenthal, managing director of Electro Sonic (left), Eric Taylor, president of Electro Sonic, Carolyn Powell, business development manager, Buffalo Niagara Enterprise, and John Stellrecht, account manager, Electro Sonic.

"This is a bold initiative during a global economic downturn," said Eric Taylor, Electro Sonic's president. "But the time is now for us to act and seize an opportunity to improve service to existing customers, attract new ones in rapidly growing markets and adjust to the tumultuous economy, and the tremendous support from the Buffalo Niagara Enterprise and other local businesses allowed us to move from idea to action very quickly."

Thus far, 55 local employees have been hired to perform warehousing, inventory management, customer service and sales functions at the 60,000 square foot warehouse and 5000 square foot office space in Riverview Solar Technology Park in the Town of Tonawanda.

Joel Rosenthal, managing director and the third generation of the family-owned business, says a lucrative opportunity exists to seize part of the emerging and rapidly growing industrial segment of the market.

"The industrial segment includes the renewable energy market – solar and wind – most of which is situated around the Great Lakes," said Rosenthal. "Our company is nearly 60 years old as a result of correctly anticipating customer needs and market opportunities; this is our latest innovation."

Creaform breathes life into Olympics symbol

Creaform (www.creaform3d.com) has produced a short animated film featuring a full-size 3D scan model of the Inukshuk that served as inspiration to the creator of the logo for the 2010 Olympic Winter Games in Vancouver. Last December, a scanning team made the trip to Vancouver and paid a visit to the Inukshuk standing on English Bay, near Stanley Park, and scanned the entire 6-m-tall stone statue using 2 of the VIUscan, the Handyscan 3D laser scanner that acquires both geometry and texture.

Festo's Regional Contact Center will serve U.S. and Canadian customers in two languages. Inset: Festo Canada president Thomas Lichtenberger at the grand opening.

Festo opens customer Regional Contact Center

The Grand Opening on March 4, 2010, of the new Regional Contact Center (RCC) located at Festo's Canadian headquarters in Mississauga, ON (www.festo.ca), marked the beginning for its U.S. and Canadian customers to present all queries regarding placement or tracking of orders, request for quotes, product support or technical assistance through the RCC.

Festo has amalgamated its Contact Centers in Montreal, Quebec and St. Louis, Missouri to better serve the more than 20,000 customer calls and 9000 faxes and emails it receives monthly from across the two countries.

Structured to answer 80% of all incoming calls within the first 20 seconds, the RCC employs a fully automated inbound call and document distribution software system featuring real-time status of call and document queue and indicated by wallboard monitors.

"We want to better serve our customers," explained Contact Center Manager Greg James. "Festo customer service representation in both Canada and the U.S. has always been superlative, and the new RCC will allow us the opportunity to increase our efficiency."

Simultaneously, Festo also inaugurated its new Customer Solutions Center at its Canadian headquarters. Along with showcasing Festo's constantly evolving leading edge technologies, the new Customer Solutions Center will offer its customers a place to examine first-hand how Festo's custom-tailored solution will work via a project simulation.

The new RCC includes: more Festo customer service employees to reduce customer wait-time; bilingual agents for French-language customers; hours of operations from 8 a.m. to 8 p.m. EST; service during both U.S. and Canadian holidays; larger outbound calling team to apprise customers of all new product innovations; and, a centralized product support team with knowledge of the more than 30,000 Festo products, including in-depth specialists for all electrical and mechanical enquiries.

News in Brief

Synergy Centre created

Canada's Technology Triangle Inc. (www.techtriangle.com), which promotes the Waterloo (ON) Region to attract and expand strategic investment, has created the Synergy Centre at 260 King Street West in Kitchener, ON.

Elobau appoints X Tronics

Non-contact sensor technology supplier **Elobau** of Leutkirch, Germany, has appointed **X Tronics Inc.** (www.xtronics.ca) of Concord ON, as its Canadian manufacturer's representative.

Noren ISO certified

Noren Products Inc. (www.noren-products.com), a thermal products provider headquartered near San Francisco, has earned its ISO 9001 certification.

Jack Jessop retires

Weidmuller Canada has celebrated (www.weidmuller.ca) the 31-year Weidmuller career of Country manager Jack Jessop at the end of 2009.

Weidmuller, Ontor announce agreement

Markham, ON – **Weidmuller Canada** has announced a distribution agreement with automation products distributor **Ontor Ltd.** With this new agreement, Ontor will distribute Weidmuller's product portfolio of control and automation connectivity and network infrastructure solutions from their locations in Ontario, Quebec and Alberta.

Lawrence Rosen (left), Ontor vice president, Terry Hodgson, Weidmuller national sales manager, and Rob Elder, Ontor president.

NSK general manager to expand Canadian operations

MISSISSAUGA, ON – **NSK Canada Inc.** (www.ca.nsk.com) has appointed Michael St. Jacques (right) GM for the global bearing and linear motion company's Canadian operations. St. Jacques' immediate plans to support NSK's Canadian customers include expanding the technical support team in the Atlantic Region, Ontario, Quebec and Alberta to provide additional customer support and advice on maximizing NSK bearing performance.

Calendar

May 17-19, 2010. Montreal. Montreal Manufacturing Show sponsored by the Society of Manufacturing Engineers (www.mmts.ca) includes factory automation.

June 3-5, 2010. Montreal. 2010 PTDA Canadian Conference (www.ptda.org) presented by the Power Transmission Distributors Association for the PT/motion control industry.

October 5-7, 2010. Toronto. Canadian Manufacturing Week at the Toronto Congress Centre, presented by the SME and including a Town Hall on Canada's wind energy supply chain (www.sme.org/cmw).

BRT-Solutions hosted executive seminar on how to design and build products for profit.

Optimizing product development boosts business performance

BRT-Solutions (www.brt-solutions.com) recently hosted the seminar, Design and Build Products for Profit: An Educational Session for SMB Executives, for small- and medium-sized businesses in Mississauga, ON. In the half day seminar, industry experts demonstrated how product development activities can boost profitability. Gary Walker, senior business analyst for **Psion Teklogix** (www.psionteklogix.com), presented on how streamlining product development enabled Psion to boost productivity and efficiency across its organization. Executives learned how face challenges with software tools from **PTC** (www.ptc.com).

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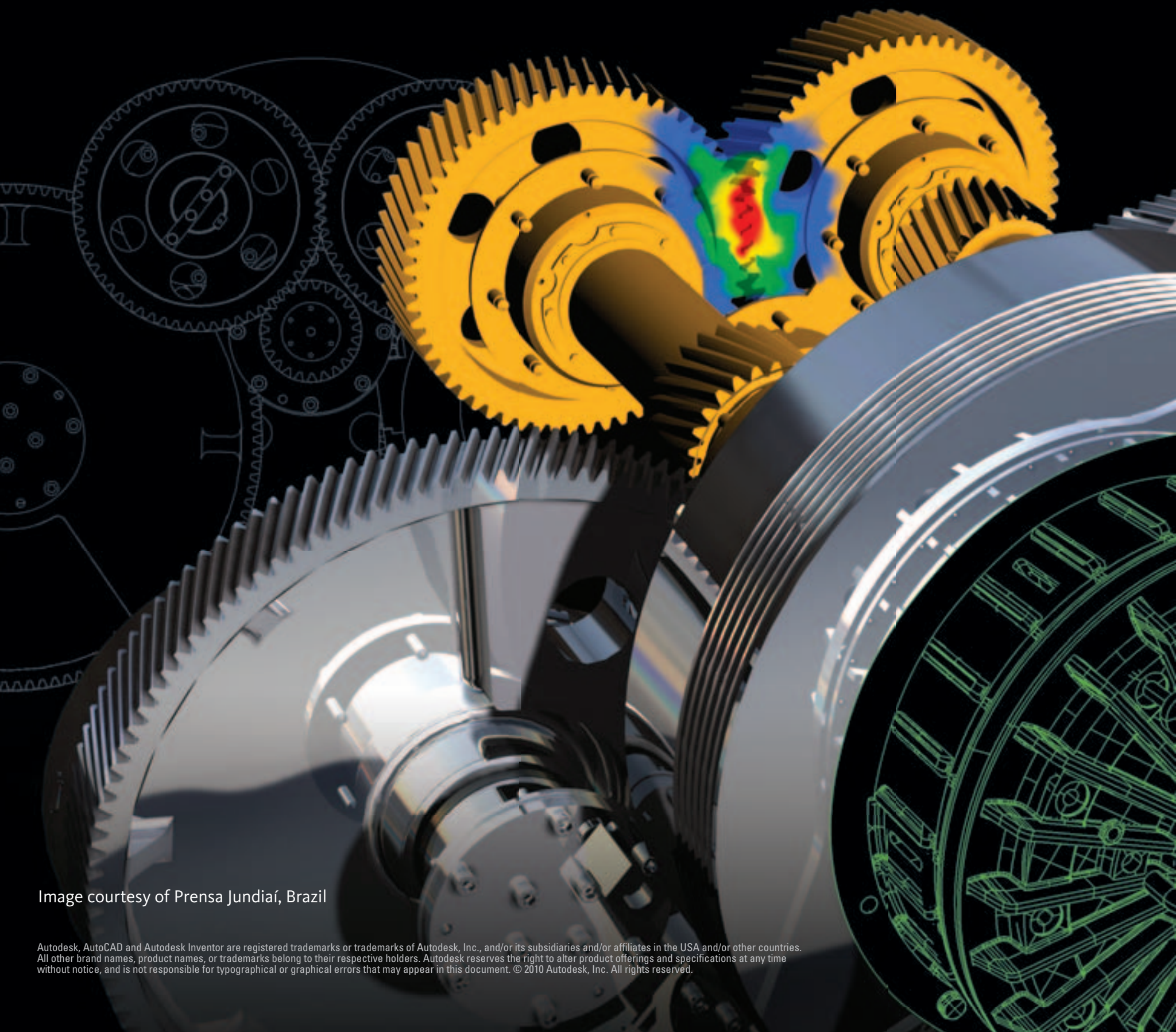

Image courtesy of Prensa Jundiaí, Brazil

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Feature: Engineered Materials

The rise of additive manufacturing gathers pace

Special to DPN

Used so long for the production of conceptual models and functional prototypes, rapid prototyping techniques are increasingly being used to manufacture finished products. And, according to Wohlers and Associates, a consulting firm that provides information on developments and trends in rapid product development, the trend is set to continue.

Additive manufacturing (AM), Direct Digital Manufacturing (DDM) or 3D printing, as the manufacture of finished parts using RP techniques is variously termed, is now second only to model making in RP applications.

The latest report from Wohlers (www.wohlersassociates.com) states that organizations, representing thousands of users and customers around the world, believe that AM will represent 35.9% of their business in five years, more than double the levels in 2008. While in 10 years time, the same companies believe it will represent 50.5% of their business.

"Methods of additive manufacturing are creating new markets for limited-edition and one-of-a-kind products," said Terry Wohlers, president of Wohlers Associates. Wohlers believes that AM is causing some companies to rethink the way products are developed and brought to market, and a new type of manufacturer is emerging that is not operating from a traditional manufacturing facility. "In the future, custom and personalized products will be manufactured on demand from a spare room at home, a garage, or even a college dormitory," he added.

AXIS Prototypes used an ABS-like polymer resin to manufacture a prototype of the new Crono 2.0 frame from Guru Bikes. The Crono 2.0 is the next generation of the world famous Crono, which it claims holds more time trial/triathlon records than any other custom carbon fibre bike in the world. The prototype was needed when it became clear that Guru would not have time to cut the molds and produce a first off in time for North America's premier bicycle trade show, Interbike 2009.

Whether novel manufacturing locations emerge remains to be seen, but the increasing AM trend is being fueled by the introduction of new materials with enhanced performance capabilities. These materials are enabling the production of finished parts with greater geometric accuracy, durability, stability and strength, and broadening the range of applications for which AM can be used.

"The rising trend in AM is due to the advent of new materials," said Vincent Laithier, sales manager at Montreal-based AXIS Prototypes (www.axisproto.com). "The benefits are clear. No tooling or molding costs, design iterations on the fly and 'just-in-time' manufacturing for lower inventory costs."

One such material, ABS-M30i, from Minnesota-based Stratysys (www.stratysys.com), is a high strength polymer well suited for the medical, pharmaceutical and food packaging industries. Parts manufactured with ABS-M30i material are biocompatible (ISO 10993 certified) and can be gamma or EtO sterilized. When combined with Fortus 3D Production Systems, ABS-M30i delivers biocompatible 'Real Parts' with excellent mechanical properties.

Another material, DMX-SL 100, from Illinois-based DSM Somos (www.dsm-somos.com), combines impact strength up to 0.80 J/cm with a flexural modulus ranging from 2000 to 2400 MPa. The company claims the material combines the accuracy of stereolithography (SL) with the durability of sintered nylon, as it has the stiffness of standard ABS-type resins, but with more than twice the impact strength, plus up to 20% elongation at break.

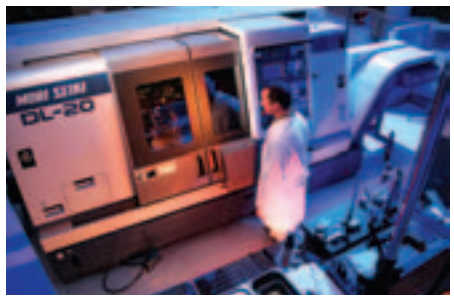
While many finished parts are being made from polymer resins, perhaps the "Holy Grail" of AM is to produce finished parts from metal. Stockholm-based Arcam (www.arcam.com), for example, provides Electron Beam Melting (EBM) technology for the production of fully dense metal parts using titanium alloys that feature good machinability and excellent mechanical properties.

The alloys offer all-round performance for a variety of weight reduction applications in aerospace, automotive and marine equipment, as well as numerous applications in the medical industry such as orthopaedic implants.

So, with the rise of AM gathering pace, where will this leave the future of the manufacturing sector?

"For short run manufacturing, AM is absolutely a viable option. While it will never replace mass manufacturing, AM is enabling the mass customization of parts," said Garry Campbell of Toronto-based Nova Product Development Services Ltd. (www.novaproduct.com).

Full Service
Motion Solutions



Finding the right micro motion solution for custom mechanical and electrical requirements means looking beyond just components. With the company's fifty years of micro motion engineering know-how, MICROMO's application engineering team has the expertise in the field to assist customers with choosing the correct component and system for unique motion control needs and to meet superior precision and reliability requirements.

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Cover Story

Industrial design appeals to hobbyists

From Front Page

really gave way to the industrial styling trends that found its way into so many products like cars and toasters. "Using this style we started sketching various contour shapes with keypads and screen displays we found one that seemed promising," added Duncan.

From the direction of the sketches IDWS created foam core mockup models. "This allowed us to create a tangible mass to help visualize the scale of keys and display required. These first models let us pick the right display angle and spacing for the keys, but also confirmed the overall size versus the visual value for the end product.

"And so we were able to modify the shapes quickly and create a product direction that Bachrus could envision – as well as a product that an older demographic could use because small keys and display read out could really hinder sales."

After the first cardboard mock-ups, IDWS built a 3D model using Rhinoceros (www.rhino3D.com), a combination of surface design with solid modeling to get the right draft angles, wall thickness, and structural ribbing for injection molding the housing correct. "We blocked in the approximate screen size, keypads and circuit board and from there we would have to add the power source and the input slots for the reader," explained Duncan.

Once blocked into CAD software, IDWS started to put the sourced components in place to confirm that enough space had been allocated. "From there we had to meet with the electrical engineers for the console and reader circuit boards, to give them an idea we had to develop what we wanted. "So we started sketching out the layout for the display finding out how many characters would be required in both static fields and variable fields that would be on display at any given time, as the line segment numbering would drive the amount of screen pins that would affect the circuit board design."

With that completed, the screen needed input from the user, and so the second area of focus was on the keypad and the order of hierarchy that would be required to operate the display. The most important number was to display the speed in either km/h or mph, with some other features like a timer and count down. From a technical point of view on the circuit board, how many carbon pills would there be under each button to complete the circuits when activated by the user? "But from an end user point of view we added known symbols and colors like red for the power button and green for the start/stop button," said Duncan.

Once the display and keypad were created, IDWS had a better sense of the power needs that would be required. As well, knowing this unit was for North America and Europe, a mobile system of using batteries became the logical choice, as this improved design efficiencies and eliminated power adapters for different countries.

"We had to find suppliers who were using RoHS and EU compliant parts for production too, and in all of this the housing was going to be assembled with machine screws with for ABS plastic," Duncan explained. "The choice was to use a PT Thread-Forming Fastener from Fabory, which helped us design specific techniques in the bosses to avoid stress cracking and sink marks on the finished parts opposite of each boss."

"In the end we wanted a mechanical, but stylish looking product that would appeal to train enthusiasts. With the efforts put into the design, the serious hobbyist can now measure accurately the scale speed, wheel/axle rpm and distance traveled during use," concluded Duncan.

"Exactly the kind of product that Bachrus wanted to present to its consumers, adding a new feature to its product line, helping to increase market share and competitiveness building their brand identity and the bottom line."

This story was edited from an article contributed by IDWS.

Rolling stand accessory reads the rotation of bearings and translates into a scale speedometer speed display.

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Medical Engineering

Setting the table for early cancer detection

By Mark Sunderland

In 1895, the Dutch physicist Conrad Rontgen discovered rays that could penetrate the body to capture images of internal shapes.

Rontgen conceded that the composition of the rays were a mystery to him at the time so named them simply "X" rays – the name that remains today – and what he also probably didn't realize was the extent to which his discovery would be the underpinning of a major diagnostic revolution.

For almost half a century x-rays were thought to be the panacea of all ills, passively examining our internal body parts. Even up-market shoe stores installed them for customers to observe the foot within the shoe. Then scientists recognized detrimental side effects and the x-ray was no longer a gimmick. Forces powerful enough to derange the atomic structure of the body had to be responsibly managed.

Compared to x-ray, Magnetic Resonance Imaging (MRI) is a relatively new technology. The first MR image was published in 1973 and within a year the first cross-sectional image of a living mouse was published. Three years later, the first studies were performed on humans.

Both the x-ray and MRI are similar in that both capture images with magnetic radiation and both are non-invasive. The principle difference is in the images they capture. An X-ray shows the contrast between soft tissue and bone density, and for this reason it is especially suitable for examining fractures. MRI shows better contrast between different kinds of soft tissue and is consequently more suitable for detailed images of tissue such as areas in and around the brain. MRI is also recognized as the most sensitive imaging modality for the screening of and intervention in breast cancer.

So far there are no known biological hazards associated with MRI. It is more versatile than x-ray as it can be used to examine a wider variety of medical conditions.

But for these benefits there is an associated cost. A physician, in consultation with the patient, generally makes the decision as to whether or not an MRI is justified. There may be cases, for example, of a suspected breast cancer when a mammogram is a sufficient test.

But for high risk patients, breast magnetic resonance imaging has emerged as a safe and sensitive imaging tool and is now recommended in addition to mammograms.

Cameron Piron BASc, MSc, is co-founder, president and chairman of the board of Toronto-based Sentinelle Medical (www.sentinellemedical.com) and is the innovator of a unique system for breast magnetic resonance imaging and intervention. The company also has a satellite operation in Waterloo, ON.

Sentinelle Vanguard systems are designed to work with GE, Siemens (shown) and Toshiba MRI scanners, adding specially designed table top coils, integrated patient stretchers, tables and interventional software.

Piron developed Sentinelle's core technology while completing his MSc in Medical Biophysics at the University of Toronto, Sunnybrook Campus.

The Sentinelle Vanguard system incorporates several innovations that make breast MRI and biopsy highly sensitive, patient friendly, efficient and cost effective, i.e. high image quality, the ability to image all areas of the breast, the ability to accommodate the greatest range of breast and patient sizes, ease of access to the breast, improved workflow in the MR suite and increased patient comfort and satisfaction.

The Vanguard breast MR system includes a table for the patient to lie on, special radiofrequency (RF) coils that can be positioned close to the breast tissue to pick up signals, and software to convert the signals into three dimensional images.

Breast cancer affects more women worldwide than any other cancer. With early detection, survival rates can improve from 21 to 96%.

The Vanguard MRI table with variable coil geometry allows radiologists to detect breast cancer even in its early stages when tumours are very small.

The solutions are designed to work with GE, Siemens and Toshiba MRI scanners, adding specially designed table top coils, integrated patient stretchers, tables and interventional software. The result is a specialized fully integrated breast imaging system that delivers the highest quality of images for the best possible treatment.

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

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Bimba PFC Cylinders are ideal for gauging or positioning applications. Available in strokes up to 24 inches. Guided models are also available (TEF and TF models), with optional rod locks.

Pneu-Turn® Position Feedback Rotary Actuator (PTF)
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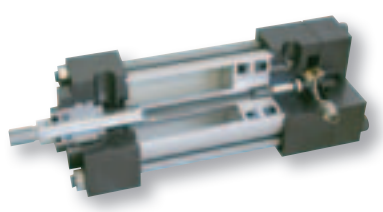


TRD Position Feedback Low Friction (PFLF)
TRD PFLF Cylinders are available in bores up to 8 inches. A variety of probe technologies are also available. Features include analog output, digital output, and CANopen, Profibus, and SSI interfaces.

Feature: Hydraulics & Pneumatics

Steer-by-wire systems with integrated torque

By Geoff Rondeau

Utility vehicle operators have gotten used to and like the "feel" of old-school mechanical and hydraulic systems.

So a critical consideration in moving to electromechanical steering is that operators want the tactile response, or "feel," provided by these steering systems. The earliest generations of electromechanical steer-by-wire systems did not provide this feedback and they did not achieve wide acceptance by vehicle users.

Thomson has developed a unique torque feedback device that addresses this need and provides several significant advantages. The new approach works much like a brake by using a magnetic actuation system to apply force to friction discs that impinge upon a rotor.

The friction disc utilizes an innovative material whose static-to-dynamic-friction performance is not subject to the slip-stick effect that is often associated with conventional brakes. Unlike other materials used in torque feedback devices, the new friction material is insensitive to temperature so it provides consistent performance over a wide range of operating conditions

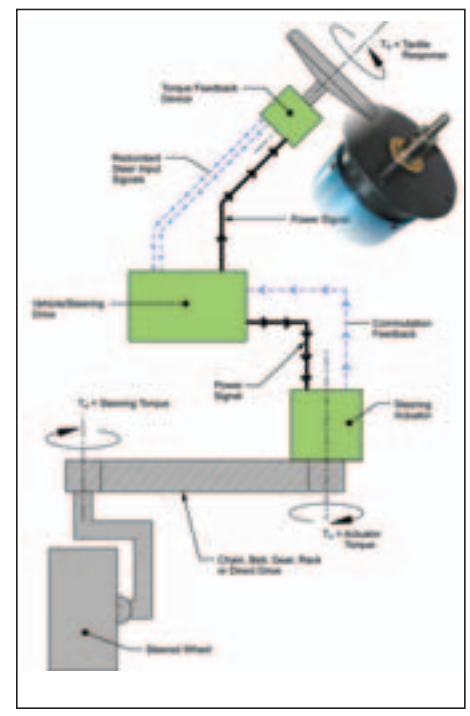
The actuation system provides a proportional torque over a wide range of applied forces and the internal air-gaps in the device remain constant regardless of wear to the friction material.

Thomson provides a complete electromechanical steer-by-wire system whereby an OEM simply needs to connect the drive motor to its gearbox, bolt the steering wheel to the housing and program the device to provide the desired functionality. The architecture offers a wide range of mechanical interfaces, voltages, torques and drive horsepower as standard.

Nilfisk-Advance, Inc. is the world's largest manufacturer of professional cleaning equipment. The company's Advance Captor 4300B and 4800B battery rider sweeper-scrubbers clean nearly twice as fast as conventional sweepers and scrubbers because they can both sweep and scrub in a single pass. This enables the productivity of an engine machine without the noise and fumes.

These cleaning machines were originally designed with direct drive steering and electrical torque assist. Nilfisk-Advance engineers made the decision to upgrade the steering system to electromechanical steer-by-wire in order to improve steering performance, reduce power consumption and make it possible to add additional features. "We considered hydraulic steering, however, the vehicle only has a small hydraulic power pack used for lifting the hopper and closing the dump door," said Kurt Vetse, mechanical engineer at Nilfisk-Advance.

"This power pack is designed for intermittent use so going to hydraulic steering would have required a new continuous-duty power pack. This would have significantly increased the cost of the steering system. We didn't want to devote the extensive resources nor expose ourselves to the risk that would have been required to develop our own steer-by-wire system from scratch. So we looked at three leading commercial steer-by-wire solutions. We selected the Thomson unit because of its compact size and low cost."



The steering actuation system provides a proportional torque over a wide range of applied forces.

Nilfisk-Advance engineers adjusted the torque feedback device to simulate the hydraulic steering systems that many customers are used to and configured the unit to provide fewer lock-to-lock steering wheel turns than are required by most hydraulic systems to reduce the amount of operator effort. They also decreased the level of steering sensitivity when the vehicle is going straight to make it easier for the operator to keep the vehicle on a straight path.

Geoff Rondeau is Product Manager with Thomson Industries Inc.
www.thomsonlinear.com

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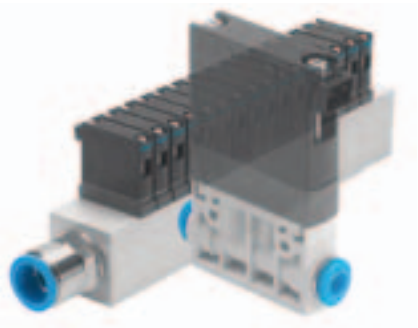

Festo has launched a series of jet valves providing switching times of less than 1 ms. Based on a unique design featuring just one moving part, the MHJ series jet valves are also said to provide very high switching time repetition accuracies, and have an industry-leading service life of 10 billion switching cycles. The jet valves are designed for use with standard 40 µm filtered compressed air supplies, and accommodate a wide range of operating pressures from 0.5 to 6 bar. Units offer a choice of three 2/2-way fast-switching models, with nominal flow rates of 50, 100 and 150 L/min.
www.festo.ca

Half-inch needle valve

A half-inch (12.7 mm) bore instrumentation needle valve developed by the instrumentation products division of Parker Hannifin is said to make it much less prone to blockages or related problems. The H-series needle valve is available in two forms: as either a discrete hand valve for controlling media flow, or integrated into a monoflange-style manifold for the safe 'double-block-and-bleed' connection of instruments to process lines. The valve operates over a range of -55° to 538°C in its standard stainless steel form. The valve has a Cv value of 2.6 and is rated for operation at pressures up to 6000 psig.
www.parker.com

Pneumatic isolation valves

Bimba Manufacturing has introduced a new safety valve (lock out – tag out style) to its line of air preparation products. Current OSHA and ANSI/PMMI standards require a lockout valve installed on all air-operated equipment to isolate the equipment from its air supply and to exhaust all downstream air pressure making the equipment safe for maintenance. The Pneumatic Isolation Valve (PIV Series) is available in nine sizes, from 1/4 to 1-1/2 in. with a full range of accessories to help companies conform to these standards.
www.bimba.com

Air service system

The Air Service System from Bosch Rexroth allows for the integration of specific function requirements employing precision controllers, distributors, 3/2-way shut-off valves or filling valves. The AS series was developed as a line of products stretching from the AS2 series with thread connections G1/4 and G3/8 for the low flow range, to the AS5 series with thread connection G3/4 and G1 for the high flow range. The line is able to cover the entire working range of systems with nominal flow rates of up to 14,500 l/min. Being ATEX-approved, the AS series can also be used in explosive areas up to zone 1 (gases) and 21 (dust).
www.boschrexroth.ca

Pneumatic position switches

The NITRA line of pneumatics products from AutomationDirect now includes the CPS series of pneumatic position switches and accessories to interface between

pneumatic actuators and electrical control systems. The switches are available in 3-wire dc PNP and NPN NO, and PNP NC configurations and can be purchased with an M8 wiring connector or 2-m cable with wire leads. Five mounting bands with adapters for round body cylinders are available ranging from 5/16 to 2 in. sizes.
www.automationdirect.com

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Spotlight

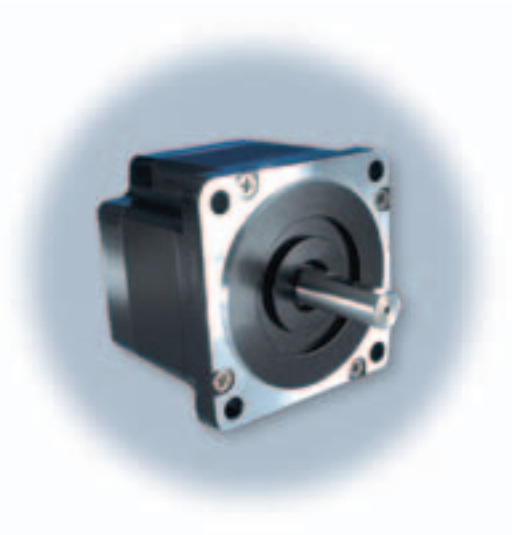
Motion Control

PROFINET option card

Danfoss Drives has introduced the VLT PROFINET MCA120 Option Card, expanding the Ethernet communication capabilities of its VLT AutomationDrive to PROFINET-based networks. The option card handles a single connection with an Actual Packet Interval down to 1 ms in both directions.
www.danfossdrives.com

Step motor drive

Applied Motion Products has introduced STR step motor drives, available in 4 and 8 A versions, and are dc input drives requiring a step and direction control signal. Units feature anti-resonance, microstep emulation and idle current reduction. The STR measures 4.64 x 2.97 x 1.29 in.
www.appliedmotion.com



UL compliant step motors

Lin Engineering has announced that its 8718 NEMA 34 step motor series has been recognized with a certification of compliance to UL. The high torque, 2 phase stepper motors are available in three body lengths: 2.6, 3.8 and 5.0 in., and are capable of up to 1288 oz in. of holding torque depending on the stack size.
www.linengineering.com

200 W servo motor

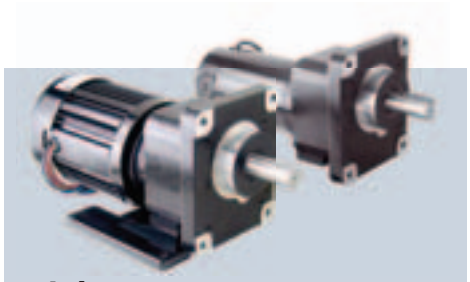
The **Maxon Motor** RE 50 servo motor combines a two-pole Neodymium permanent magnet with patented winding technology. The drive measures Ø50 x 108 mm and is available with four different windings. It reaches a nominal torque of up to 0.38 Nm, a nominal speed of 2800 to 5700 rpm and an efficiency of more than 90%.
www.electromate.com

Linear motor feedback

SICK Stegmann has introduced the TTK70 motor feedback system. The TTK70 is an absolute, non-contact linear measuring system that delivers measuring lengths up to 4000 mm, resolution of <1 µm and system accuracy of <10 µm, at operating speeds up to 10 m/s and range from -30° to 85°C.
www.stegmann.com

16-channel digital I/O in 12 mm bus terminals

Beckhoff Automation has expanded its bus terminal I/O system with ultra-compact HD Bus Terminals. The 'high density' bus terminals feature 16 digital I/O channels in the housing of a 12 mm electronic terminal block. Using Beckhoff Bus Couplers or DIN rail-mounted controllers, the HD terminals are compatible with almost every major fieldbus. The terminals are available in both Beckhoff Bus Terminal and EtherCAT Terminal versions.
www.beckhoff.com/hd-busterminal



High torque gearmotor

Bodine Electric Company has upgraded and expanded its Type CG line of gearmotors. The CG gearhead is paired with Bodine's most powerful variable speed electric motors, the 48R6, ac inverter-duty, and 42A7 permanent magnet dc motors. The integral gearmotor design allows the gearhead to deliver up to 1000 lb in. of torque, nearly twice the torque of any previous Bodine product.
www.bodine-electric.com

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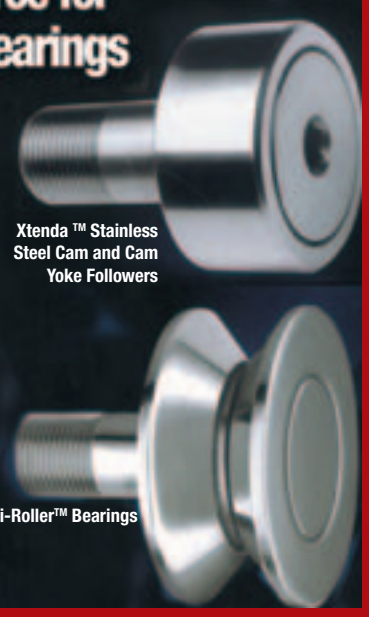

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Feature: Enclosures

Thermoelectric cooling for industrial enclosures

By Judith Koetzsch and Mark Madden

A French physicist named Jean Charles Peltier laid the groundwork for modern thermoelectric cooling in the 19th century as he experimented with electricity.

Other than a fan, thermoelectric coolers don't require the components of conventional systems

Passing electric currents through two dissimilar metals (wires made from copper and bismuth), Peltier noticed that a change in temperature occurred at the junctions between them. One junction point of the wires got hot while the other got cold.

This phenomenon of the heat transfer of an electrical current at the junction of two dissimilar metals, known as the Peltier Effect, is the basis for thermoelectric cooling.

Conventional cooling systems like air conditioners and air-to-water heat exchangers rely on chemical refrigerants or water to cool, or remove heat from, enclosures. In addition to refrigerants, air conditioners use compressors, evaporators, condensers and fans to provide cooling.

Other than a fan, thermoelectric coolers do not need any of the things required by air conditioners and air-to-water heat exchangers to effectively cool industrial enclosures. The Peltier Effect allows thermoelectric coolers to provide cooling without refrigerants, water or components such as compressors and coils.

A typical thermoelectric cooler contains a "Peltier element," a fan, and a power supply.

Peltier elements are constructed of two bonded semiconductors, often consisting of bismuth doped with telluride and copper. The semiconductors used in Peltier elements are referred to as "N-type" and "P-type." An N-type semiconductor has an overabundance of electrons and the P-type semiconductor lacks a full set of electrons. This electron deficiency creates "holes" in the P-type semiconductor's molecular structure that are ready to accept the extra electrons moving over from the N-type semiconductor.

These electrons move when the electric current from the power supply is passed through the semiconductor, carrying heat with them and leaving behind a cool surface. The fan then blows across this cooled surface and circulates cooled air throughout the enclosure.

When we speak about efficiency, we typically refer to the amount of "work" produced by a machine in relation to the amount of power that is put into it. Efficiency in cooling is described using the term "coefficient of performance." The Coefficient of Performance (COP) is the ratio of heat energy that is removed to the amount of electrical power supplied. For the past several years, most of the thermoelectric coolers available on the market operated with a COP as low as 0.3.

This means that for every 1 W of electrical energy invested, only 0.3 W of heat energy were removed, which is not very efficient at all. Thanks to design improvements, the COP of today's thermoelectric coolers can be as high as 1.2.

A key design improvement that has helped to increase the efficiency of thermoelectric coolers is active control, and one of the best control methodologies for efficient energy usage (and improved lifespan) is pulse width modulation (PWM). With PWM, power to the thermoelectric cooler is quickly switched on and off at a constant frequency.

Switching the voltage on and off in this manner will allow the thermoelectric cooler to deliver greater cooling capacity and efficiency – doing more work while consuming less power.

As previously discussed, since thermoelectric coolers work electronically – using the Peltier elements to generate cooling – the only moving parts are the fans used to circulate cool air throughout the enclosure.

Single (or ganged) thermoelectric coolers from Rittal can be mounted externally or internally on enclosures.

This provides a number of benefits when compared to enclosure air conditioners.

With fewer active components, there is a lower risk of component failure and less required maintenance. Along with solid-state construction, this leads to higher reliability, lower maintenance costs and consistent cooling.

Fewer moving parts also produce less vibration, acoustic and electrical/EMI noise. Many applications that might be impractical for air conditioners or air-to-water heat exchangers because of noise or vibration concerns can be cooled effectively with thermoelectric coolers. For example, thermoelectric coolers are ideal for applications that involve high-precision processes, sensitive or intricate electronics, or integral sensors that are susceptible to vibration and noise interference.

A smaller physical size (both in linear dimension and weight), thanks in part to limited internal components, creates an immediate advantage when compared to most air conditioners and air-to-water heat exchangers before the unit is ever turned on.

This relatively small size – as small as 16 x 5 x 6 in. (H x W x D), weighing as little as 5 lb – allows thermoelectric coolers to be used in ways that other cooling devices cannot.

Thermoelectric coolers can cool pendant arm-mounted and otherwise suspended HMI enclosures without dramatically affecting the weight load placed on the arm or pendant system. They can also be used in multi-unit configurations.

Judith Koetzsch Product Manager for Climate Control Products and Mark Madden is the Lead Applications Engineer for Climate Control Products, both at Rittal Corp. This article is excerpted from the Rittal White Paper 304: Thermoelectric Cooling for Industrial Enclosures.

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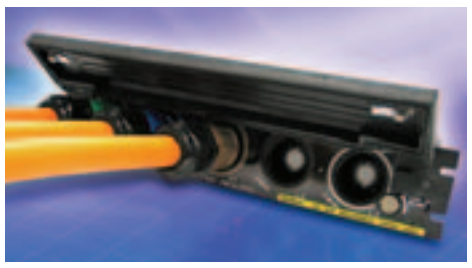
Products: Enclosures

Global wall-mount enclosure

Pentair Technical Products has announced the Hoffman brand FUSION G7 Global Wall-Mount Enclosures. Featuring a scalable design with a number of internal component mounting provisions and options, the enclosures are available in 30 standard metric sizes ranging from 300 x 300 x 225 mm to 1500 x 900 x 425 mm. Enclosures include a galvanized back panel and easy-to-install removable bottom gland plate that facilitates cable entry modifications and wire installation.
www.hoffmanonline.com

Box with flange meets IP65

ITT Interconnect Solutions has enhanced its PowerLock Box with a flange to provide simple and secure sealing into equipment panel cut-outs. Available in lidded and non-lidded versions, the flange unit features an extended front panel measuring 107 mm, providing a seal around the entire box. Connector ports are sealed to IP65 specifications. The box features IP2X finger protection for additional safety, and is available in 400 A and 660 A versions. Voltage rating



is to 1000/1500 Vdc, with an operating temperature range from -30° to 85°C and life cycles to 500 connections.
www.ittcannon.com

Support arm systems

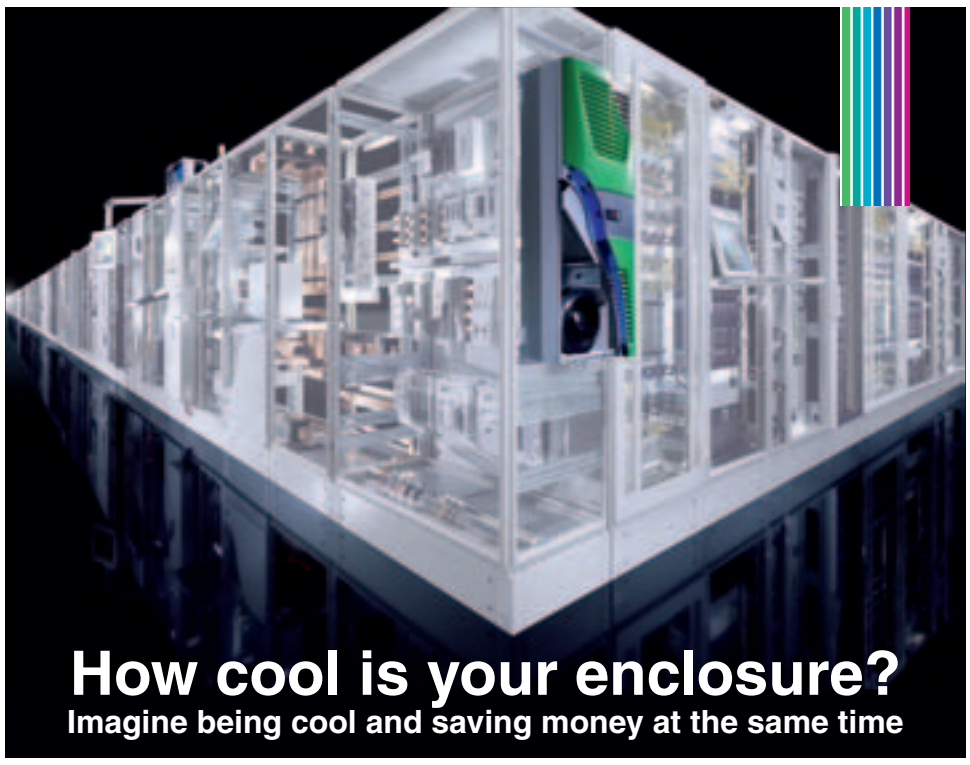
Rittal Systems has announced it is expanding its range of configurators for the Comfort Panel and Optipanel command panels by adding another engineering tool: the new Configurator for support arm systems. Now, the new CP-C support arm system and the established CP-S, CP-L, CP-XL support arm systems can be configured quickly and securely via the Internet, the company says. The system configurator guides the user automatically through the individual request screen menus. Depending on the system configuration of the jib length, enclosure weight, cable cross-section and design, the online-tool proposes an ideally coordinated support arm system for the specified requirements.
www.rittal.ca

10-inch ac fans

Orion Fans has announced 10-in. ac fans designed specifically to move a large amount of air through confined spaces. Designated the OA254 Series, the AC fans measure 254 x 89 mm (10 x 3.5 in.) and feature airflow of 547 CFM on the standard model and up to 850 CFM on the XC high performance model. Available in 115 and 230 Vac versions, the fans feature voltage ranges from 80 to 130 Vac, and 160 to 260 Vac, respectively. Rated power for the standard model is 35 W and up to 75 W on the XC high performance model. Rated speed ranges from 1650 to 2700 rpm. The fans feature a dual ball-bearing system, impedance and thermally protected motor, and diecast aluminum frame with a PBT, UL94V-0 plastic impeller. Maximum static pressure is 0.39 in. H2O for the standard version and up to 1.14 in. H2O for the high performance model, with noise levels to 69 dB and operating temperature range from -20° to 80°C. The fans feature a life expectancy of 60,000 h at 40°C.
www.orionfans.com/html/oa254.html

Versatile Eurotec caseframe

The Eurotec caseframe from Verotec offer a range of configurations available by choosing different combinations of standard parts, with the most popular options defined with a single order code. It is designed for applications that require the housing of Eurocard-based cards or modules in a desktop, 19 in. rack mount or portable enclosure. Eurotec accepts standard 3U and 6U Eurocards, with standard depths of 9.5, 14.2 and 18.9 in. (240, 360 and 480 mm) in each option and a choice of backplane or DIN41612 connector rear extrusions. 4U and 7U units fitted with additional ½U high reversible ventilated covers offer enhanced convection cooling and 5U and 8U versions fitted with a ½U ventilated top cover and a 1½U bottom cover, fitted with a front filter unit, accepts a drop-in fan tray for forced cooling.
www.verotec.us



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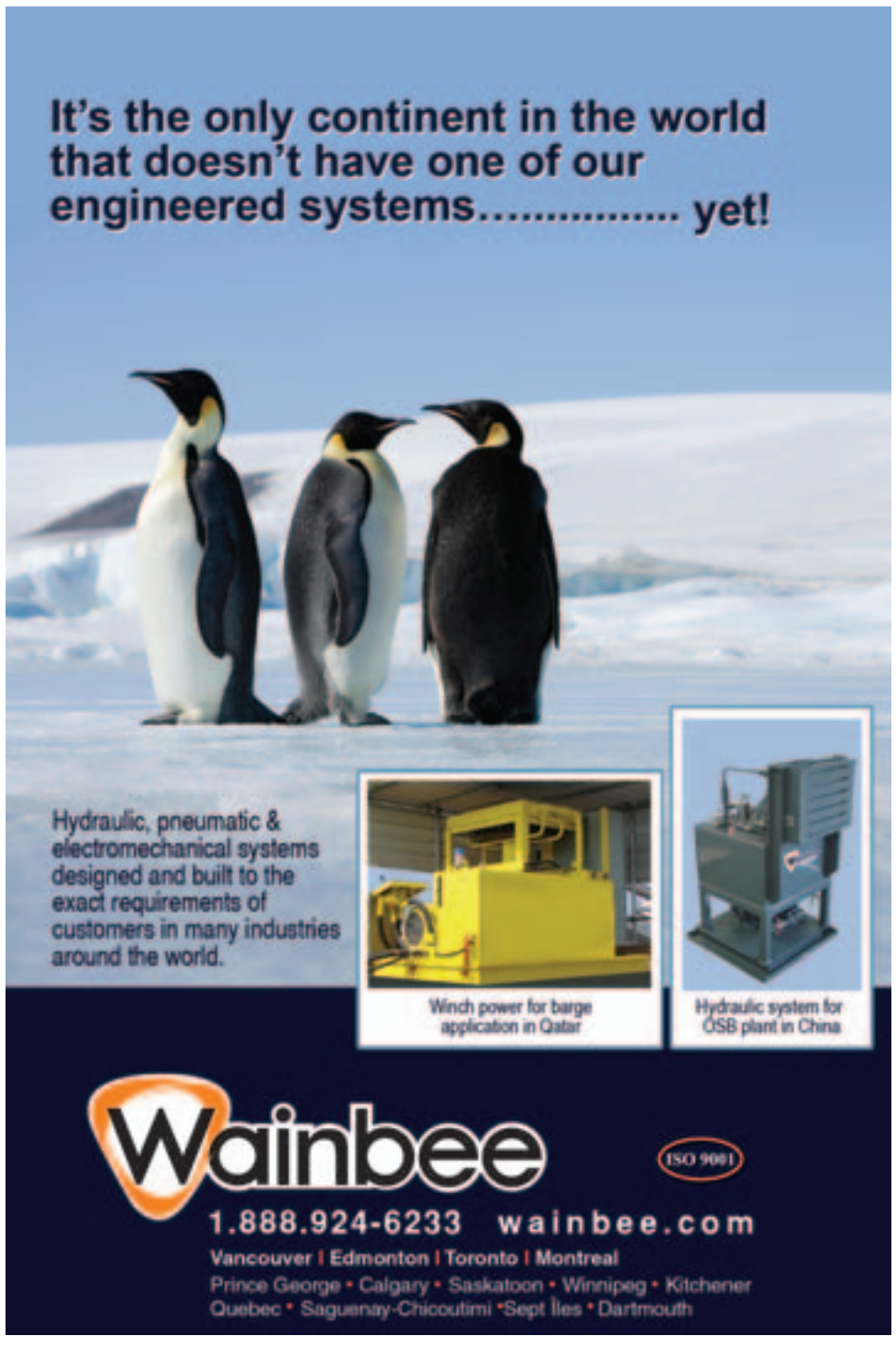


Products: Sensors

Optical sensor detects leaks

To eliminate the problems associated with fluid leaking from tanks, pumps, vessels, trays and other containers, Baumer has introduced the FODK 23 optical sensor for leak monitoring. The evaluation electronics for this sensor are housed in a chemically-resistant, IP67-rated sheath made of Teflon PFA. Typically, 1 ml of leaked liquid will make the sensor react. The sensor is screwed or glued onto a dry floor or base panel in the area where leakage might occur. The sensor's PVC or PFA installation clip allows the device to be snapped into place and removed quickly without requiring tools.
www.baumer.ca

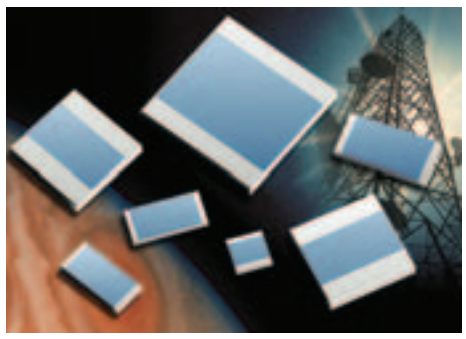
Thermal imagers

The Testo 875 imager from ITM Instruments has a thermal sensitivity of 0.08°C, a temperature range of -20° to 280°C, a 160 x 120 focal plane array and a 3.5 in. display. The unit features 2 GB of image storage, software, is RESNET compliant and includes SD card, USB cable, Li-ion rechargeable battery, charger, tripod adapter and carrying case. The product is also available in kit packages that include a case, standard lens 32° x 23° and two-bay battery charger.
www.itm.com

Proximity switch

Standex Electronics has introduced the R12575 micro-proximity switch. Built around the Standex GR200 ultra small magnetic reed switch, the R12575 is .379 in. long and has a .098 in. diameter. The proximity switches are suited for applications where the magnetic field is very low and where space limitations are a major design factor. There is no power draw in the off state. Lead length and termination can be customized. Units have a typical operating time of 0.2 ms, and release time of 0.1 ms (typical). The power rating is 3 VA maximum and will switch 0.1 A dc (Max) with a carry current rating of 0.5 A dc. Switching voltage is 50 Vdc (Max). Operating range is -40°C to 125°C.
www.standexelectronics.com

Microwave heating sensors



State of the Art, Inc. has introduced a line of microwave heater sensor chips using platinum on alumina and oxidized silicon. Potential applications include determination of thermal resistance of IC chips, variable optical attenuation of arrayed waveguide gratings, and thermal management in miniature chambers (mini-cell arrays). Available with two design options, the TM365 with two thermal sensors in close proximity to the heater for stringent temperature control, and the TM364 single sensor design with moderate temperature control. Both designs with operating temperatures up to 250°C. The self-heating of the sensors is below 4 mW/°C.
www.resistor.com

Solenoid valve protection

E-T-A Circuit Breakers has introduced the E-1071-623, a solid state remote power controller developed to switch and monitor hydraulic and pneumatic solenoid valves and magnetic brakes. The actuators with 24 Vdc coils are often fitted into steel production machinery and processing plants. The double pole device is designed for rail mounting and compensates different cable lengths and cross sections The double electronic switching output is short-circuit-proof and ensures physical disconnection of supply in accordance with the standard. Integral optocouplers activate the PLC and provide visual status and failure indication. Wire break is detected even if only the valve plug with LED wiring is connected.

www.e-t-a.ca

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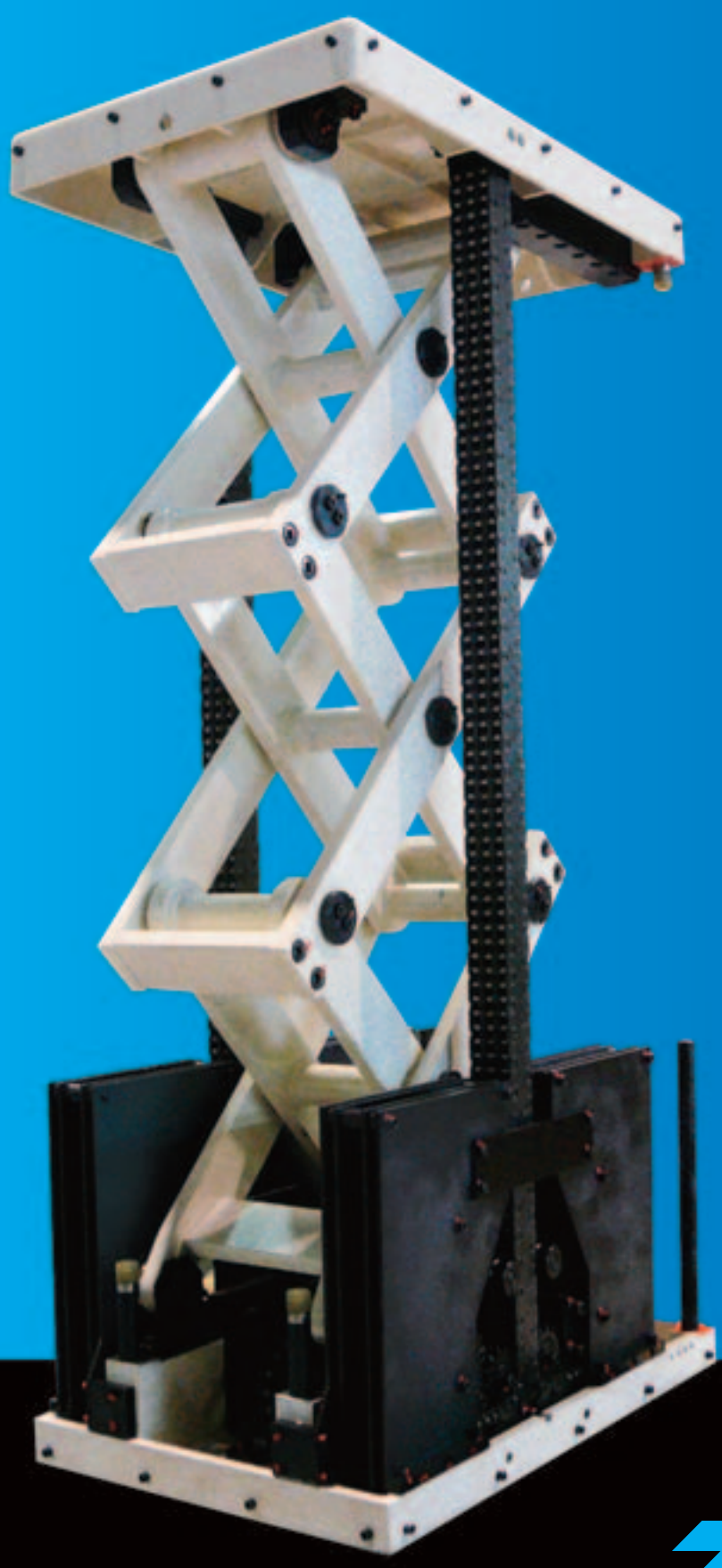

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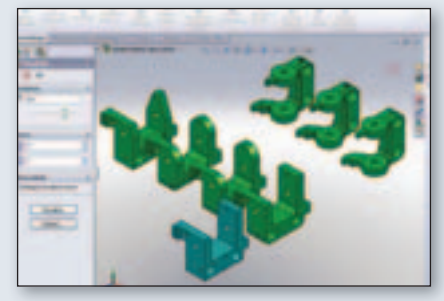
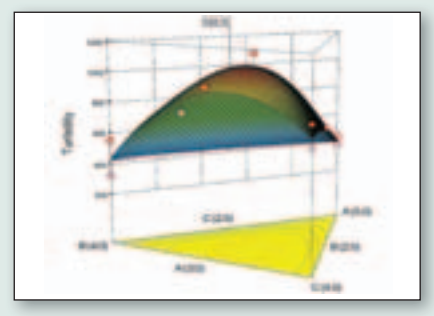
CAD Chronicle

Shape search finds parts



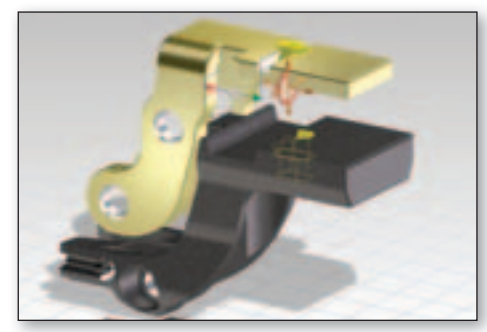
3DSemantix has demonstrated its integrated 3DPartFinder geometry-based search engine for SolidWorks. The software allows a designer to search for similar parts using a 3D model as input to the search engine, not alphanumeric characters. One way is to load an existing file of the target part and launch 3DPartFinder. Another is to sketch the 3D shape of the target part in SolidWorks, and then find similar parts.
www.3dpartfinder.com

Design of experiments software



Stat-Ease, Inc. has announced Design-Expert, Version 8. The design of experiments (DOE) program is used to optimize a product or process. Statistical tools include: two-level factorial screening designs to identify the vital factors that affect a process or product in order to make breakthroughs; general factorial studies to discover the best combination of categorical factors, such as source versus type of raw material supply; and, response surface methods to find the optimal process settings.
www.statease.com/soft_ftp.html

Explicit modeling technology

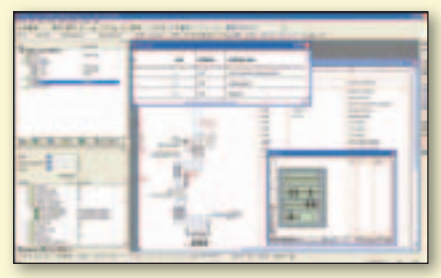


PTC has announced CoCreate 17.0, its explicit modeling 3D CAD software. Productivity gains with the latest version as compared to CoCreate 16.0 include: accelerated design productivity by up to 2x; reduced time spent creating 2D profiles by 40%; models modified up to 2x faster; models modified with the new push and pull design paradigm 3x faster; and, reduced the time spent creating and modifying advanced 3D patterns by 60%. CoCreate and Pro/ENGINEER are also said to now work together to allow companies using both tools easier collaboration.
www.ptc.com/products/cocreate/

Software for production engineering

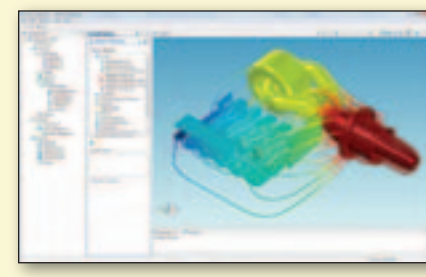
Edgecam 2010 R1 from **Planit** offers Automatic Feature Recognition enabling efficient toolpath generation from imported models. The latest release extends this powerful functionality with the ability to recognize an increased number of features, including any area that has multiple open sides. Full properties of the features, including depth, radius/chamfer and min/max XY radius are said to enable users to select appropriate tooling and cycle parameters with ease.
www.edgecam.com/

Electrical engineering documentation comparing



A module for the **Zuken** electrical engineering E3.series with E3.RevisionManagement enables users to compare and document changes between projects. It provides reports and tracking functionality for traceability and comparability in the design of wiring, harnesses, cable assemblies and control panels and also enables users to verify compliance with industry standards.
www.zuken.com/e3/

Multiple physics simulation



COMSOL Multiphysics Version 4.0 software is said to streamline the product design workflow. The new Model Builder with its unique graphical programming tool guides users from model creation to simulation results while providing full control and complete oversight of their simulation tasks. CAD connections are extended with the new LiveLink for Pro/ENGINEER as well as enhanced Parasolid support for importing and exporting geometry.
www.comsol.com

CAD Industry Watch

AutoCAD 2011: The productvity power is in the details…

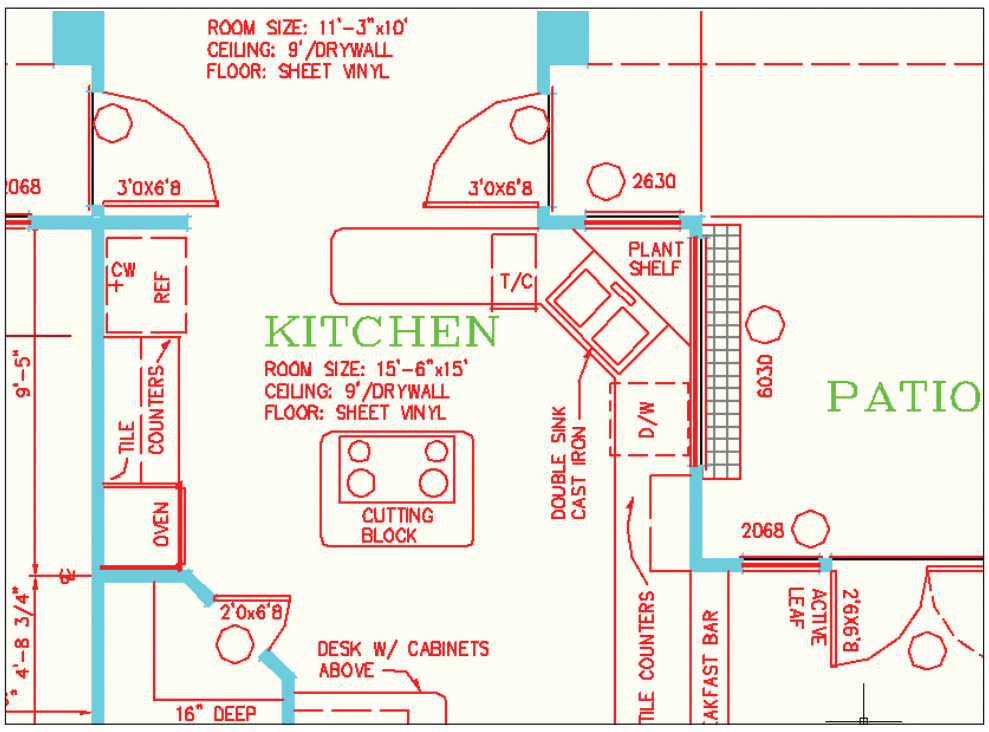
By Bill Fane

Most reviews of the newest release of a CAD program focus on the introduction of significant new object types and major new functionality. AutoCAD 2011 from Autodesk (www.autodesk.com/autocad) does indeed have these items, but I think the items that often get lumped under "and many other minor enhancements" are the ones that will be of the most interest and the most beneficial to the majority of users.

For example, let's look at the new AddSelected command.

Suppose you have a very complex drawing with many different layers, and some objects have had property over-rides added (eewww!) so that color, line type, and/or line weight are not ByLayer. You now want to create another object of the same type, such as a line or a circle that has the identical properties, but don't want to bother finding out what its layer and property overrides are. No problem. Simply click on an object, right-click, and then select Add Selected from the context menu.

AutoCAD 2011 will now automatically start the appropriate command so you can produce another instance of the same type of object. The new object will be on the same layer and will possess any property over-rides as the source object, but can be in whatever location and of whatever size you choose.



AutoCAD 2011 lets us select one or more objects...and then hide them temporarily, or isolate (hide everything except) them.

There are three other new commands that are closely related to this one.

First, SelectSimilar lets you pick an object and it then selects all "similar" objects. "Similar" can be filtered by properties such as layer, line type, colour, block name and so on, but not by object type.

Next we come to the equal-but-opposite HideObjects and IsolateObjects command. Once again they are invoked by clicking on an object or objects, right-clicking, and then selecting the appropriate item from the context menu. The HideObjects command makes the selected objects invisible, while the IsolateObjects command does the opposite and makes everything except the selected objects invisible.

In a similar vein, AutoCAD 2011 has the capability of being able to highlight everything that belongs to external reference (XREF) files.

These commands can be very useful when working on a complex, crowded drawing and are much faster and more selective than the usual technique of freezing and thawing layers.

Speaking of XREFs, it is now possible to edit nested XREFs from within the master host drawing.

Grip-editing has been enhanced. In particular, polylines (PLine) now have an extra rectangular grip in the middle of each segment. You can use it to move a segment and hence stretch the adjacent ones, or you can add a new vertex, or you can convert a line segment into an arc segment and vice-versa.

Another "minor" enhancement that will appeal to many users is that if you have a custom line type definition, then you can optionally always have the text read the right way up no matter how the lines or PLines wander.

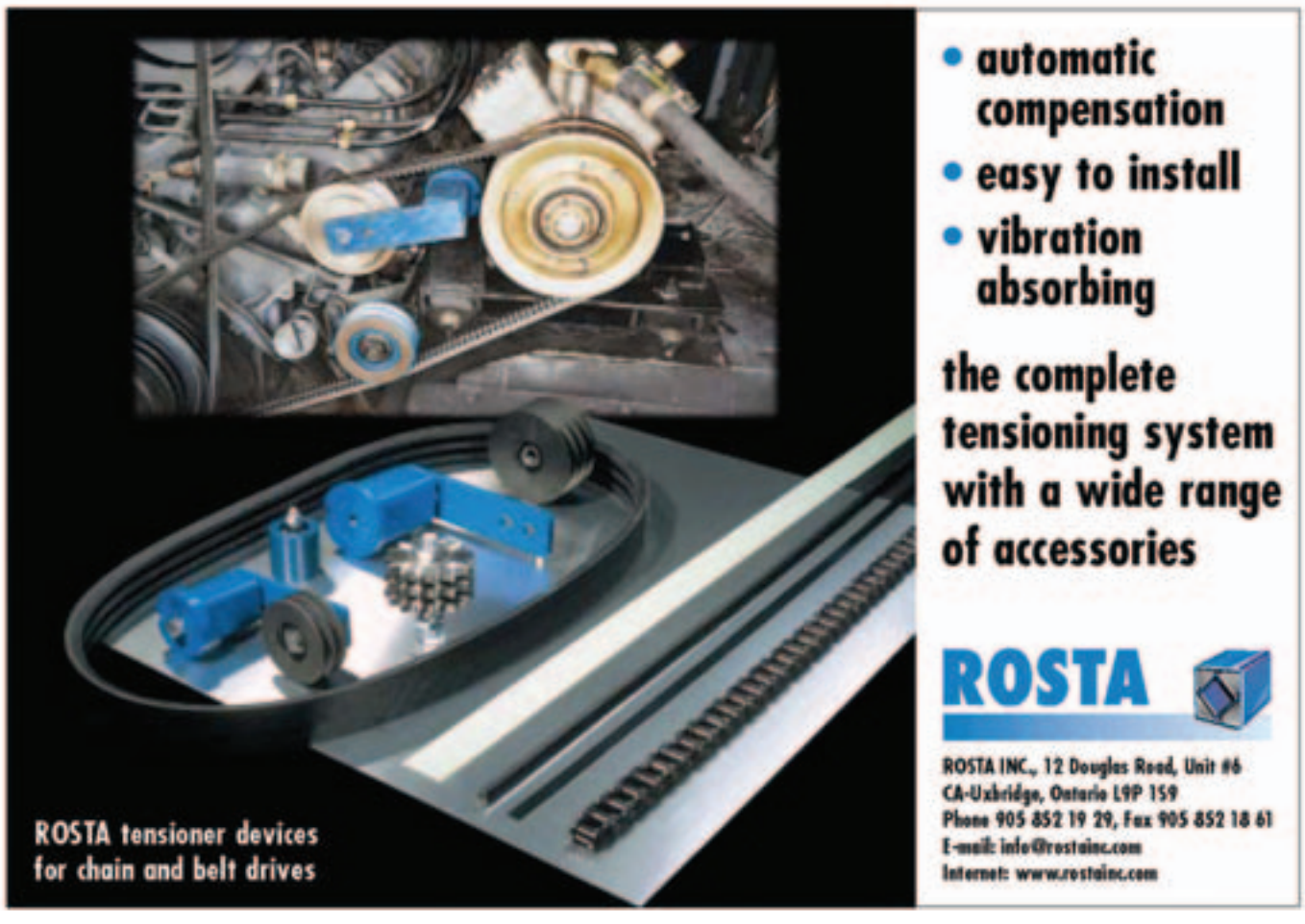
It's the subtle improvements that can sometimes make the biggest difference. AutoCAD 2011 does not change the capabilities of the new-to-2010 parametrics, but one little interface difference can help immensely.

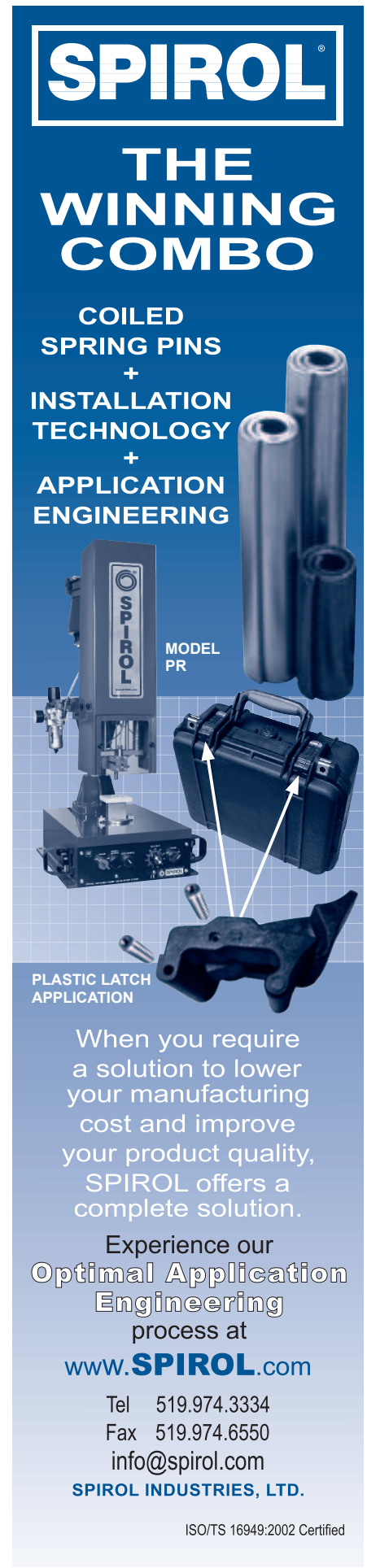
Previously, there was only one fundamental command to apply single geometric constraints. There were menu and ribbon picks for each of the different types of constraint, but every time you wanted to apply another constraint you had to pick it from the menu or ribbon again, even if it was the same type as the one you just applied.

There are now individual commands for each of the types of geometric constraints. Having applied one constraint you can just press the space bar to repeat the command when you want to apply another of the same type. It's still not quite as good as Inventor where the individual commands repeat automatically until you decide to stop, but it is still a vast improvement.

AutoCAD 2011 may not have the big "gee wiz" attention-grabbing features of other releases, but the sum total of its smaller features certainly add up to productivity improvements.

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





Automotive Scene

Stronger, lighter, renewable plant materials gaining popularity in vehicle components

By Bill Vance

With increasing concerns for recyclability, lower fuel use and emissions, weight saving and reduced dependence on oil that is subject to volatile price fluctuations, automobile manufacturers are increasingly interested in fabricating parts using renewable resources like plant material.

Biomaterials research is encouraged by public-private programs such as the Government of Canada's Auto21 Network of Centres of Excellence program and the Ontario Government's BioCar Initiative. Biomaterials are defined by worldwide standards organization ASTM as containing at least 20% natural content by weight.

The Ontario Research Fund, through the BioCar Initiative, is investing $5.9 million over five years for research into the use of biomaterials for motor vehicles. This synergy brings together Ontario's two largest industries, automobiles and agriculture, with research conducted by the Universities of Guelph, Toronto, Waterloo and Windsor. And as Dr. Larry Erickson, Research Program Director, Bioeconomy – Industrial Uses at the University of Guelph, notes, since biomaterials principally use non-edible plants or by-products, they do not impact food production such as the largely corn-based ethanol program can.

Materials used are almost as wide as researchers' imagination, and include wheat straw, switch grass, soybeans, miscanthus (a normally tropical grass proving adaptable to temperate climates) and cornstalks. One appeal of biomass is that a variety of base stock means its application can be quickly disseminated around the world.

The Government of Canada's Auto21 is investing over $84 million in federal and private sector funding for new innovations in a variety of automotive related projects, including bio-based plastics and bio-fibre reinforced polymers. This coast-to-coast program involves some 44 universities, 300 researchers and 500 students and more than 240 private-public sector partners. The public-private aspect assures that once products are developed the private partners have a vested interest in bringing them to market. Participants include Magna International, Woodbridge Group and Canadian General Tower.

Materials used are almost as wide as researchers' imaginations, and include wheat straw, switch grass, soybeans, miscanthus and cornstalks

The auto industry is fertile ground for biomaterials applications because petroleum-based plastics currently make comprise some 20% of a car's weight. Practical uses to date have been door panels, floor mats and consoles.

Ford has been particularly active in biomaterials. In collaboration with University of Waterloo researchers led by Leonardo Simon, who developed an innovation to incorporate 20% wheat straw as a plastic reinforcing agent, and with plastics compounder A. Schulman of Akron, OH (www.aschulman.com), Ford is using it in the 2010 Ford Flex's third-row storage bin.

Wheat straw not only saves petroleum, but is 10% lighter. Straw's robust physical qualities has Ford hoping for use in more demanding internal, external and underhood applications like air vents, door panels, trim and exterior body panels. Ford is already using seats with backs and cushions containing form made from soybean oil rather than petroleum. They are in the Mustang, F-150 pickup and other Ford vehicles.

At the University of Windsor, post-doctoral physicist Inna Seviaryna is researching the structural integrity of switch grass for incorporation into polypropylene composites. She is hoping such a combination will be both lighter and stronger. Door panels have already been fabricated for testing.

Toyota has incorporated plastic containing castor bean oil in the radiator end tank of the 2010 Camry. And a new compact luxury car coming from Toyota will use approximately 60% bioplastic in components such as interior panels and sun visors.

Biomaterials and renewables are even reaching into racing. For example, researchers in England have produced a Formula 3 open wheel race car (a development ground for Formula 1 drivers) that is made almost entirely of recyclables that include potato starch, flax, hemp, carrot fibre and soy. Its fuel is biodiesel made from chocolate fat, a waste product, and it has run many test kilometres at Brands Hatch, a Kent, England racetrack where it reached speeds of 238 km/h.

Tires are also being explored for biomaterials. Japan's Yokohama Rubber is developing a tire in which petroleum oil is replaced with orange oil which it obtains from the orange peel discarded by an adjacent orange juice plant. Sumitomo Rubber plans to go even further with a tire containing no petroleum oil.

Of course, to win wide application with automobile manufacturers, biomaterials will have to meet their targets of durability and cost, one reason it is so important to have car makers involved from the ground up.

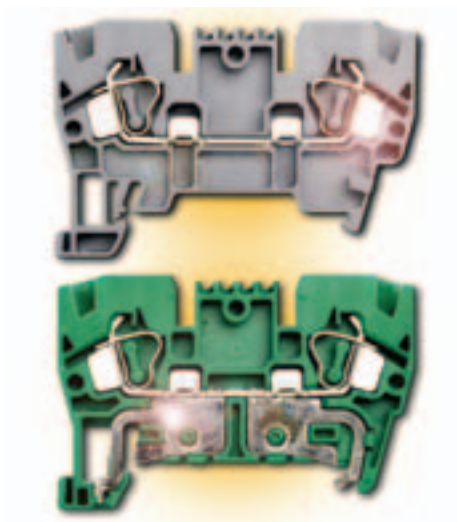
Bill Vance is an automotive journalist and author.
www.billvanceautohistory.ca

Products: Connectors

Disconnect conduit adapter

TURCK has announced a conduit adapter plate that mounts onto a 3/4-in. Form 7 style conduit body. When used in conjunction with TURCK's standard conduit adapter housings, it will provide a quick disconnect solution on the outside of the 7 style conduit bodies. The adapter plate has an integrated gasket that seals to the conduit body to provide IP67 protection when a TURCK conduit adapter with seal is mounted onto it. Mounting hardware is included for ease of installation.
www.chartwell.ca

Feed through terminal blocks

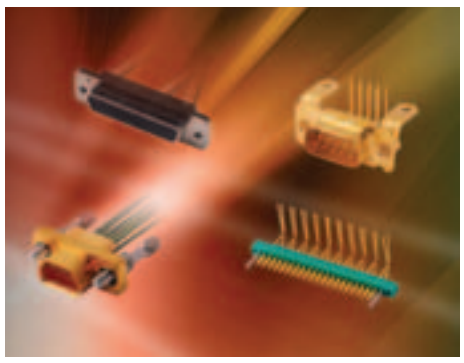


The YBK series of feed through terminal blocks from Omega use a tension clamp connection style. The DIN rail mountable YBK series is available in gray, blue, red, yellow, beige, and green. A line of accessories include end plates, end brackets, cross connectors and marking tags. Units are suitable for applications involving control panel and electrical panel wiring.
www.omega.ca

Junction boxes for PV panels

Heyco Products has announced PVB-101 junction boxes designed for manufacturers of single diode, double ribbon photovoltaic panels. Boxes feature a low profile design said to maximize usable solar panel collector space and low insertion force connectors that make panel connections easy and less costly to install with no soldering. Added features include n ambient temperature range of -40° to 105°C. The boxes are also IP65 rated, UL approved and are TUV certification-pending.
www.cordscanada.com

ESA QPL-qualified connectors

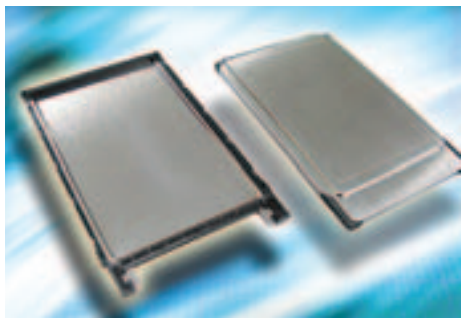


TC&K Components has announced a broad range of ESA QPL-qualified high reliability connectors. Including the MDM, MDMA, D*M and MTB1 Series devices, the rectangular connectors meet stringent outgassing and residual magnetism requirements, and conform to a number of ESA and MIL qualifications and quality levels. The connectors are employed in various space equipment applications, as a connection between PCBs and various modules within a satellite system.
www.ck-components.com

mV range signal conditioner

An mV signal conditioner has joined WAGO's JUMPFLEX line of signal conditioners and relays. The 857-819 mV signal conditioner accepts bipolar mV inputs from -100 to 1000 mV, and converts to a current or voltage output. Current output available is in 4 to 20 mA, 0 to 20 mA, 0 to 10 mA and 2 to 10 mA variants; voltage output available in 0 to 10 V, 2 to 10 V, 0 to 5 V and 1 to 5 V variants. Signal conditioner terminations are designed for reliable performance in temperatures ranging from -25° to 70°C.
www.wago.us

PCMCIA I/O card kits



ITT Interconnect Solutions has developed snap-on and ultrasonic PCMCIA I/O kits with a variety of customizable features. The snap-fit PCMCIA kit consists of a pair of mechanically-assembled stainless steel card covers that are said to provide the PC card with both torsional stiffness and excellent drop test performance, while the ultrasonic kit welds the plastic cover set around the PC card ultrasonically to create a solid protective shell. The connector can withstand >10,000 mating cycles.
www.ittcannon.com

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Technical Literature

High-pressure tube connector. Parker Hannifin has published a 40-page guide to its range of ferrule-less tube connectors for pplications that provide permanent connections for instrumentation tubing systems operating to 20,000 psi. Assembled by means of a push-fit operation taking seconds, Phastite connectors can reduce installation costs by factors of up to 90% or more compared with welded or cone-and-thread fittings.
www.ipde-innovations.com/lp/phastite/

Urethane casting resin. Technical bulletin from **Epoxies, Etc.** describes 70-2170 urethane casting resin for producing stable cast parts that have an "ABS-like feel and appearance." The resin system was designed for product development and low volume manufacturing.
www.epoxies.com/tech/70-2170R.pdf

Ball screws. Thomson has announced a >250-page *Lead Screw, Ball Screw and Ball Spline Catalog* that details the company's line of lead screws, inch and metric series ball screws, and ball splines, including product specifications and performance attributes.
www.thomsonlinear.com

Pumps. *Technical Bulletin 47019I* from **Oilgear** cover the introduction of the PVG-150 pump – the latest member of the PVG open loop pump family. With this addition, the PVG pump line now consists of six displacements in three different frame sizes (SAE 'B', 'C' and 'D').
www.oilgear.com

Miniature springs. Lee Spring has added Bantam Mini Compression Springs to its online catalog, with smaller diameters to its REDUX Wave Spring line, and expanded its stock compression spring offering in wire sizes from .006 to .013 in.
www.leespring.com

Process and control. The *Volume MMXIV Omega Temperature Measurement Handbook 7th Edition* offers detailed information and specifications on over 40,000 products for process measurement and control featured on over 2000 pages.
www.omega.ca

Linear and rotary motion. The Ternary intelligent integrated actuator catalog from **Wittenstein** features options that allow customers to mix-and-match their requirements to choose the product the application needs. Included are Ethernet/IP and analog position control interface.
www.wittenstein-us.com/tech-support/manuals

Loudspeaker circuit design. *Current-Driving of Loudspeakers: Remedy to the Fundamental Fallacy of Sound Reproduction Technology* by Esa Meriläinen argues that conventional loudspeaker technology is flawed and introduces a new method for loudspeaker feeding called current-drive.
www.current-drive.info

Industrial wireless I/O. The *SureCross Industrial Wireless I/O Network* brochure from **Banner Engineering** offers a line of 1 W data radios for serial communication over the air, remote I/O Nodes and power options, including battery and solar-power systems. Described are the DX70 platform – a point-to-point cable replacement system for a 12 I/O-point pair – to the DX80 wireless I/O point-to-multipoint network with a variety of input-types and power options.
www.Bannerengineering.com/surecrossbrochure

Advisory Board Directions

"Math gene" myth threatens future of Canadian industry

By John Bachmann

Canadian manufacturing's survival depends on exploiting any competitive advantages that we may have as an industry and as a country.

Our education system is frequently cited as one of these advantages. However, viewed from the perspective of Canadian industry's best interests, what is currently happening in our elementary and secondary schools is quite worrying.

For a few years now there's been a lot of talk about the need to do a better job with literacy, math, science and technology education. Does this mean that students graduating from Canadian schools now and in the near future will include the large numbers of numerate, literate, science savvy, and creative workers that Canadian industry needs? Unfortunately, that's not likely for a long list of reasons, two of which I will briefly touch on.

Firstly, the overwhelming majority of Canadian elementary teachers are general arts graduates. Many have not taken any math since the last required course early in high school because they "weren't any good at it." When they struggled in math, they were told that that was a normal state of affairs because many people don't have an aptitude for math, i.e. they're missing a "math gene."

When these teachers teach math to their students, their discomfort with the subject matter is palpable and the students pick up on it. It doesn't help that the curriculum, instead of building a solid foundation of arithmetic skills and then progressing to more advanced concepts, introduces many of these concepts in the very early grades.

When their students struggle to learn using this curriculum, elementary teachers help the best they can, but underlying their efforts is the assumption that having trouble with math is a normal state of affairs.

Math tutors have long known that the assumption that math is inherently too difficult for many is bunk. For at least 20 years, concerned parents, appalled at the math homework their kids have been bringing home, have resorted to rationally structured programs like Saxon Math (www.saxonmath.com), through either home or commercial tutoring, to remediate their children and wrest them from the clutches of mathphobia.

More recently, John Mighton and his JUMP program (http://jumpmath.org/) have demolished the "missing math gene" myth by demonstrating in public schools, even those in poorer neighbourhoods in Toronto, that virtually everyone can learn arithmetic. The kids using JUMP not only learn arithmetic and more advanced top-

The "inconvenient truth" is that too many elementary school teachers are mathphobic

ics in mathematics, they actually progress to the point that they like doing math!

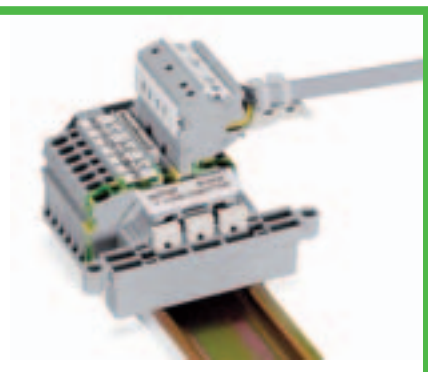
On a side note, but still relevant to this discussion, is the fact that Canadian public elementary schools use a "discovery" approach instead of a "direct instruction" approach to teach all subjects, not just math. Extensive research shows that boys, who will continue to be the majority in technology programs, do not learn as well as girls using the "discovery" approach.

This situation would be no more than annoying if parents could easily access alternative schools that take a "direct instruction" approach or use JUMP or Saxon math, but this gets me to my second point.

Canadian educators seem to be ideologically opposed to any direct instruction methods that incorporate rote learning. As a result, most attempts to provide parents with access to a direct instruction curriculum by, for example, allowing charter schools within our public systems are met with hysterical warnings about "neo-con agendas" and "privatization."

The fact that many charter school initiatives in the U.S. have been led by poor parents fed up with schools content to lower their standards and baby sit their kids through to a dubious high school diploma is an "inconvenient truth" for our education establishment.

John Bachmann is Corporate Sales & Marketing Manager, Wainbee, and Chairman, Canadian Fluid Power Association.



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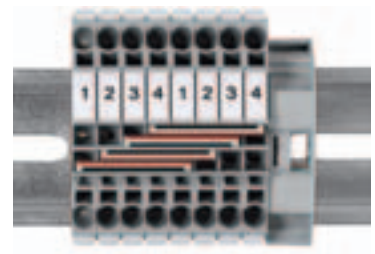

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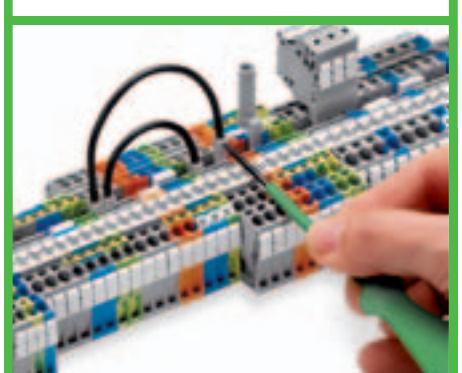

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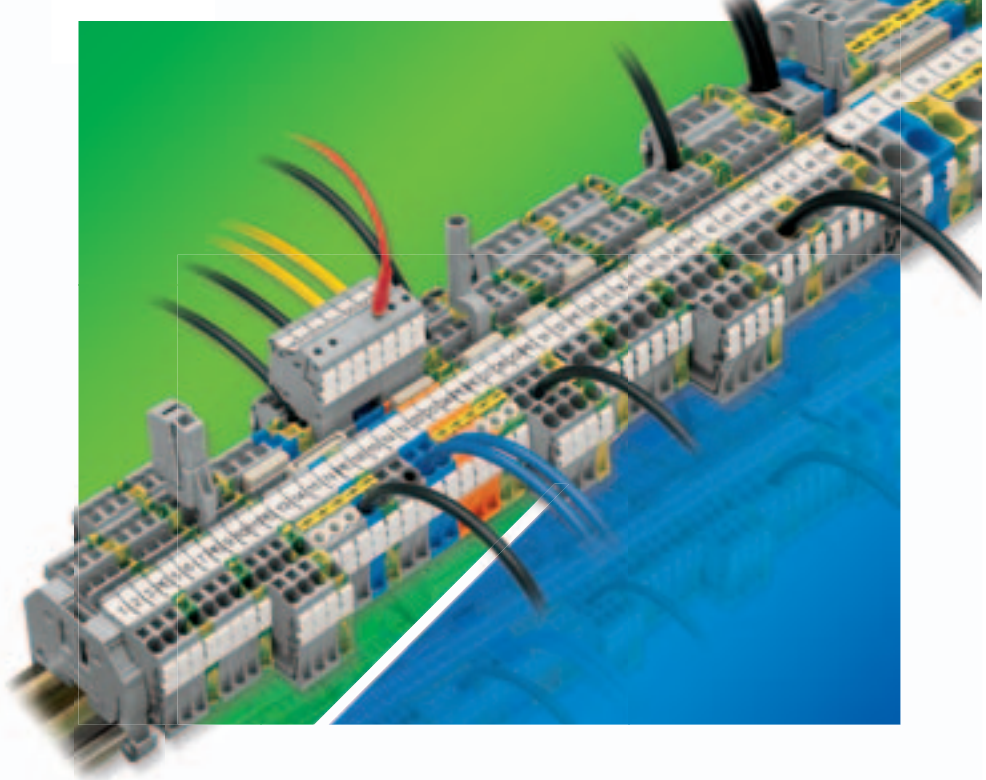

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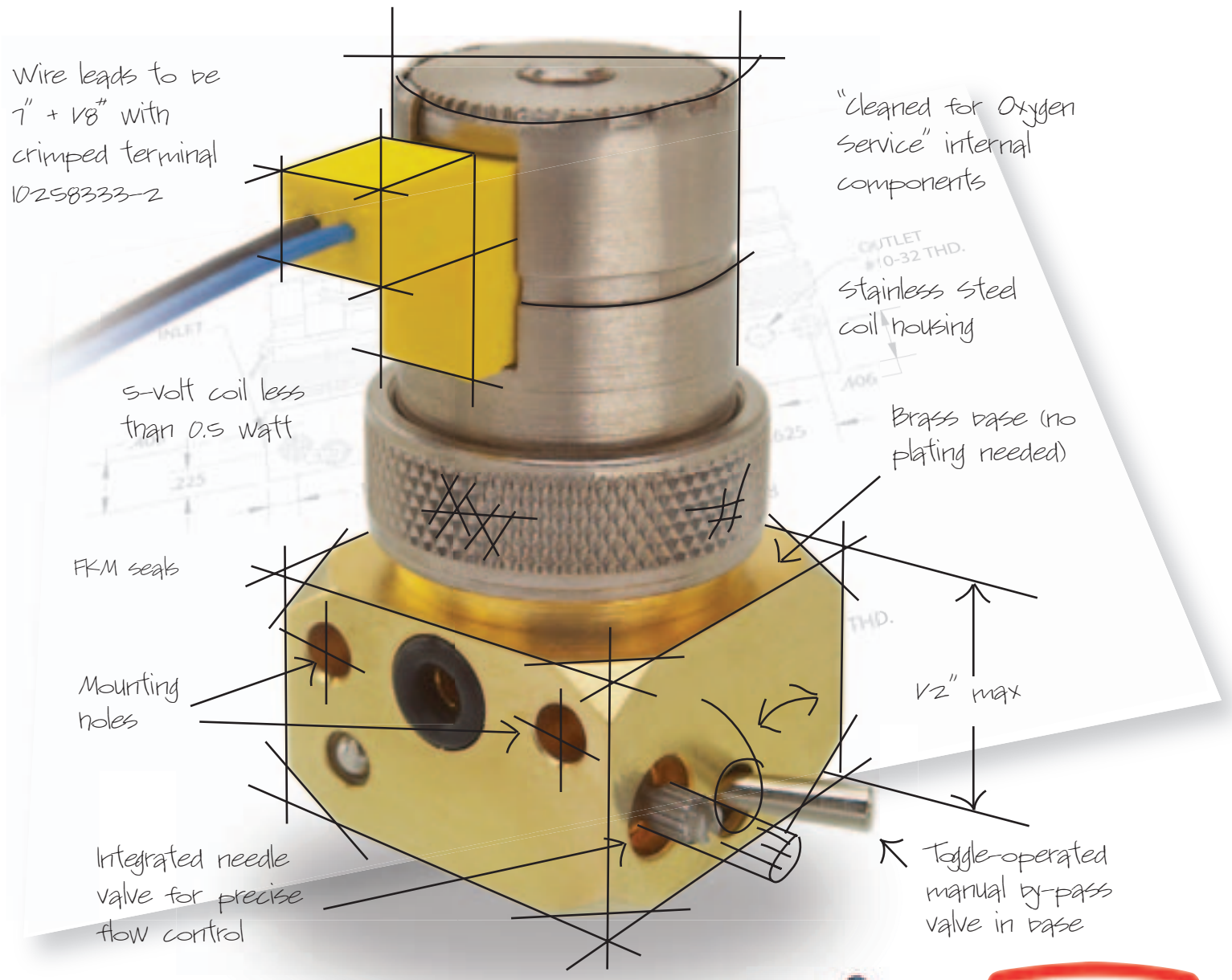

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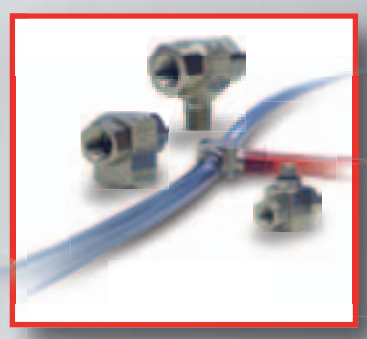

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