

DPN DESIGN PRODUCT NEWS



Covering the total design engineering function in Canada

November/December 2009



Linear positioning stages

Velmex has announced the XSlide line of linear stages for positioning of testing samples. Units are constructed with hard coat anodized, aluminum dovetail ways and PTFE bearings, making them suitable for either indexing or scanning applications. They have a load capacity of 35 lb horizontally and 10 lb vertically.

www.velmex.com



Retaining rings

The Smalley Steel Ring Company has introduced Hoopster retaining rings, designed to fit into much shallower grooves than regular snap rings or retaining rings. Suitable for thin wall tubes, standard sizes are from 3/8 to 3 in. and available in carbon and 302 stainless steel.

www.rotoprecision.ca



RTD data acquisition

The PT-104 from Omega is a 4-channel, temperature data acquisition module for use with Pt100 and Pt1000 RTD sensors. The CE compliant unit uses RS232 or USB interface. Windows software is included for basic data acquisition and display.

www.omega.ca

Volume 37 Number 6



PM# 40063602

PAP Registration No. 10773



Drive bridges gap in conveyor market

By Mike Edwards

Food & beverage production, courier depots, big box store warehouses and airline baggage claim zones are all material handling applications that demand constant uptime. What if you could design a conveyor drive that has all the benefits of an advanced drum motor with the flexibility of an outboard C flange electric motor?

Earlier this year, Van der Graaf Inc., of Brampton, ON, introduced its patent-pending Cross Drive technology, a drive roller that combines the benefits of conventional drive methods for powering conveyor systems.

The unique Cross Drive technology implements the efficiency, space savings and safety benefits of internally powered conveyor drive rollers and combines it with conventional external drive design that allows for quicker and more economical conveyor moves or maintenance, according to Rick Zander (above), account manager at Van der Graaf.

The product has already gained market acceptance from the giant courier company UPS, which is currently running Cross Drive units.

The Cross Drive's gear assembly is housed within a sealed conveyor drive roller protected from the environment and is connected directly to an external motor, eliminating the chain/sprocket or belt/pulley used in conventional systems.

The electric motor, which is the most sensitive component on any conveyor system and the most likely to require replacement or exchange, can now be simply removed by loosening four bolts, Zander explained. The Cross Drive roller easily slides into place and is secured with the bolts, then the motor of choice is attached to the roller shaft with a standard coupler.

"The motor is external to the Cross Drive," said Zander, "because we didn't want to compete with commodity motor manufacturers."

Cross Drive technology combines a variety of benefits:

- **Space savings:** The low-profile units are available in 6.5- and 8.5-in. diameters and require less operating space than conventional in-line drives by eliminating speed/gear reducers, allowing systems designers

Continued on page 6

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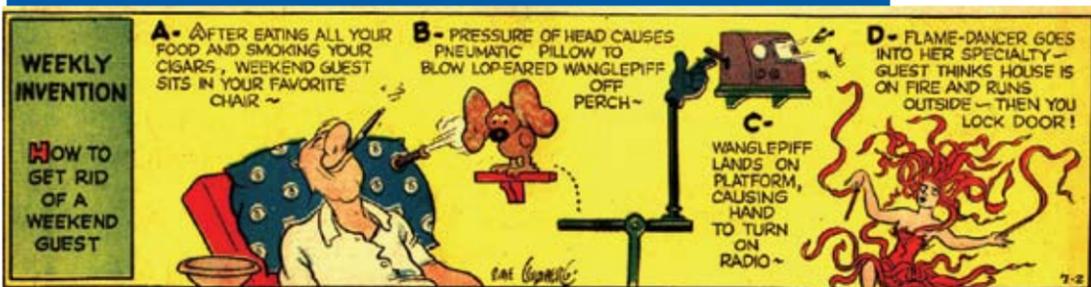
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Stainless Steel Air Cylinder 1-1/16 inch bore, 6 inch stroke, double acting, pivot/double end mount	\$24.50 A17060DP		\$42.84 36696847	\$30.31 6498K658	\$34.25 6W130

All prices are U.S. published prices. Many other part numbers are available from all vendors. AutomationDirect prices are October 2009 prices. MSC prices are from www.mscdirect.com 09/03/2009. McMaster-Carr prices are from www.mcmaster.com 09/03/2009. Grainger prices are from www.grainger.com 09/03/2009. Prices subject to change without notice.



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In this issue



8

Vickers-Warnick machine safety seminar series provides design tips

Machine Guarding and Machine Safety presentation at the IAPA Centre for Health & Safety tackles important government legislation, international technical standards and engineering design considerations created to protect workers on the factory floor.



12

High-performance plastic bearings assist turf equipment manufacturers

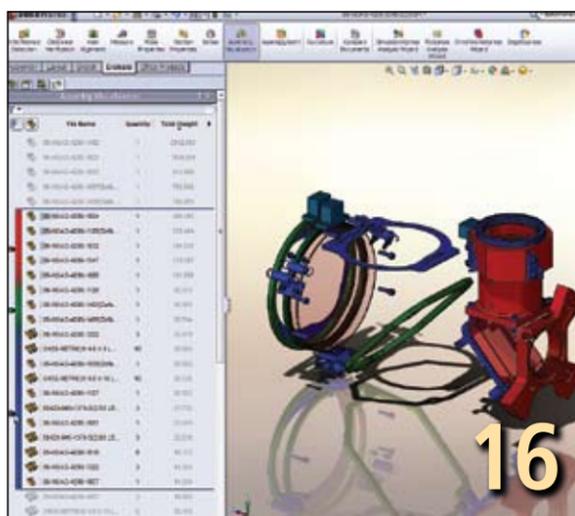
Advanced synthetic compounds offer more design opportunities than traditional materials, according to igus. Turf machinery (above) bearings in Saskatoon-based Rogers Sprayers have benefited by going plastic.



15

NX software helps UOIT team meet electric car competition deadline

The University of Ontario Institute of Technology (UOIT) was one of 17 North American university teams participating in EcoCAR: The NeXt Challenge, a three-year engineering competition established by the U.S. Dept. of Energy and GM.



16

User interface and sustainability key developments in SolidWorks 2010

Software reviewer Bill Fane examines the latest release from Dassault Systèmes SolidWorks. User interface improvements add functionality to mouse gestures and SustainabilityXpress module provides material options.

DEPARTMENTS:

- 8 By Design**
Siemens Canada opens TIASTAR Motor Control Centre in Burlington, ON
- 10 Sensors Product Spotlight**
Latest in sensing products and technology
- 14 Enterprise CAD**
PTC views on design collaboration across the enterprise using SharePoint and Windchill
- 19 Medical Engineering**
Mark Sunderland examines rapid simultaneous HIV and Hepatitis testing solution from MedMira of Halifax
- 20 Automotive Scene**
Bill Vance reports on the controversy and complexity of testing the "fuel" economy of electric vehicles
- 21 Advisory Board Directions**
Millan Yeung of the National Research Council's IRAP program takes a closer look at why manufacturers need to factor in new "green" materials processing into their operations

Advertisers Index

- Ace Controls 18
- Airtrol Components..... 18
- Altair Engineering 14
- Amacoil Inc. 18, 20
- Autodesk..... 7
- AutomationDirect..... 3
- Baldor 9
- Baumer Electric..... 17
- Clippard 24
- Conductix Corp. 10, 18
- Cords Canada 15
- Emphatec..... 17
- Festo 5
- Fluid Metering 10
- Master Bond 17
- MFG.com 12
- M.W. Fasteners 10, 18
- Noren Products 18
- Omega 2
- Phoenix Contact..... 23
- Pivot Point 18
- PTC 11
- SAVA Industries..... 18
- SEW 13
- Smalley Steel Ring 18, 20
- Solidworks 19
- Velmex 17
- Wainbee..... 22
- Williams Fluidair Corp..... 18, 21
- Wittenstein 6, 18

DPN DESIGN PRODUCT NEWS

DIGITAL EDITION

November 2009



DPN editor
Mike Edwards

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Renderings



Intellectual Property for Management: bank agreements & the freedom to operate (say what?)

By Mike Edwards, Editor

Did the headline above throw you for a loop? Has DPN's editor accidentally published something intended for *Canadian Lawyer* magazine?

No, I haven't, because "Intellectual Property" is of primary concern to designers and manufacturers as Canada goes forward with its recovery in the industrial sector. To address IP issues Design Product News welcomes Charles Boulakia, a patent attorney with the Toronto-based IP firm Ridout & Maybee LLP as a contributor.

"Patents exist to allow companies, researchers and others to protect their valuable innovations and leverage them to further their business goals," says Boulakia. "As such, they are a business tool, and must be understood that way."

Boulakia will contribute a series of articles – available online at www.dpn-canada.com and linked through the *DPN eLETTER* – that discuss real-world intellectual property issues for "non-patent professionals." The series is meant to provide the business manager with some insight, context and useful tools for how

There is no way you can be 100% sure you don't infringe on a third party's intellectual property

to deal with patent-based issues on a business level. The articles are not legal advice or opinion. Intellectual property issues are complex and often unique circumstances need to be considered, explains Boulakia. (Consult your intellectual property professional before making any decisions based on the educational information provided, he added.) Here's an excerpt of his first column; the complete version is at www.dpncanada.com/intellectualproperty:

"So you've finally found a financial institution who will loan your business some money," starts Boulakia. "You've worked out the broad brushstrokes – the interest rate, the amount borrowed, and the repayment schedule. You've even discussed the collateral – the bank has asked for a security interest in everything you own, including your intangible property. You're pretty sure you know what this means, and that you're willing to accept that risk."

"But then you receive the agreement from the bank, and, because it's an important loan, you actually read it. And it turns out there's a whole lot in there you didn't discuss in the 'broad brushstrokes.'

"One section is particularly worrisome. Labelled something like 'borrower's representations and warranties,' it is a long laundry list of promises about your business. One has you especially worried. It's long and convoluted and in legalese, but as best as you can translate, it says some-

thing like 'Borrower's business activities do not infringe on any third party intellectual property.'

"The problem with this clause, of course, is that you have no idea whether you infringe on any third party intellectual property."

As I said above, there's only room for this excerpt, but follow the link above to find the "rest of the story."

Since the last issue of *DPN*, I have settled into the role of Editorial Director, Manufacturing Group here at my publisher,

CLB Media Inc.

I will continue to perform as Editor of *DPN*, but my role has expanded to embrace three other magazine/online titles within our Manufacturing Group: *Canadian Electronics*, *Metalworking Production & Purchasing (MP&P)* and *Produits pour l'industrie Québécoise (PiQ)*. I'm now also able to tap into the talents of *MP&P* Editor Jerry Cook and *PiQ* Assistant Editor Stéphane Quesnel as *DPN* contributing editors, and from Daniel Comand, Manufacturing Group online editor.

When you add *DPN's* Editorial Advisory Board from industry and our expert columnists Bill Vance (automotive), Mark Sunderland (medical) and Bill Fane (design software) contributing to every issue, we make up an experienced, comprehensive team to keep you informed and entertained.

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Cover Story



Van der Graaf designs and builds its drum motors at the Brampton, ON, facility. The company has the capacity to wind motors and machine precision parts for a broad range of applications. Click on the video button to follow a step-by-step procedure of its drum motor manufacturing process.

Cross Drive combines the best of both worlds: internal drive efficiency & safety with external drive flexibility

From Front Page

the flexibility to use belt conveyors in more applications. A 5-in. model is next on Van der Graaf's plans. Chain/sprocket or belt/pulley arrangements and their associated safety guards are also eliminated allowing end-users to lower conveyor profiles and reduce conveyor line clearances. Also, a line of specialized sprockets, designed to drive an industry-standard segmented conveyor belt, attached to the cross drive roller expands the application range.

- **Energy efficient:** The transfer of power from the motor's drive shaft to the drive roller's outer shell is 96% mechanically efficient through a precision-cut, hardened-steel gear assembly. Also, rotation of the motor's shaft is parallel with the axis of rotation of the drive roller's shell.
- **Safe operation:** No external moving parts eliminate the possibility of employee injury and/or product contamination. OSHA requires chain guards for conventional systems, but they are eliminated with the Cross Drive design. Eliminating the chain guards also eliminates components that require maintenance. Another safety concern is noise in the workplace. OSHA requires that employers provide protective noise-abatement devices in areas that exceed set limits. The Cross Drive is internally-driven, significantly reducing noise decibel levels.
- **Maintenance-free operation:** Time-consuming housekeeping, maintenance and repair is required to keep conventional systems lubricated, tensioned properly, clean and in good working order. These tasks, if neglected, eventually shorten the life of the drive system.
- **Installation flexibility:** The cost to retrofit a conveyor with Cross Drive technology is said to be surprisingly low and cost effective. If the motor fails a replacement can be installed quickly, significantly reducing the downtime needed by conventional external drive systems.

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Van der Graaf has a history of over 50 years behind the Cross Drive, producing drum motors or motorized pulleys that house all components internally, eliminating the need for external components like motor, gearbox, sprockets, chain, chain guard and pillow block bearings. This reduces operating and maintenance costs, improves safety conditions, and because it is completely sealed our drum motors can operate in extreme environmental conditions.

Its Sanitary Series drum motors are able to withstand chemical and extreme pressure wash down, ensuring that the highest level of hygiene is maintained. "The food sector is our biggest industry, with customers such as Maple Leaf and Kraft," said Zander.

The rugged design of the Van der Graaf drum motors are space saving, quiet, efficient and reliable with virtually no maintenance. It offers a versatile, less complex and more efficient way to power a belt conveyor.

Standard drum motors are available in a wide range of diameter sizes, belt speeds, horsepower, face widths and standard ratings to address most applications.

www.vandergraaf.com

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Image courtesy of Engineering Center LTD, Russia

By Design

Machine safety education: electrical, mechanical, essential

Vickers-Warnick (www.vickers-warnick.com), a motion control and automation product industrial distributor based in southern Ontario, presented a Machine



John Murphy, corporate manager of Fluid Power & Safety at Vickers-Warnick: Risk assessment is a job for all parties in a factory, since an operator might notice one thing and an engineer might notice another.

Guarding and Machine Safety seminar last month at the IAPA Centre for Health & Safety Innovation in Mississauga, ON, for close to 75 safety personnel from industry.

John Murphy, corporate manager of

Fluid Power & Safety at Vickers-Warnick (right), recommended the CSA standards for the guarding of robots, punch presses, and other machinery. He detailed how the hand speed constant for reaction time of 63 ips applies to both people and devices such as programmable controls, palm buttons, light curtains, safety mats and servomotors. "Ergonomics is also becoming more and more important," he added. Risk assessment is a job for all parties in a factory, since an operator might notice one thing and an engineer might notice another.

Murphy noted that if you have 75 people in a room, you'll 75 different "acceptable" levels of risk assessment. Things to monitor when creating machine guarding are "can personnel be injured if they go over, under, through or behind" the protective measures? Murphy implored: "Ask yourself, 'would I let my kids operate that machine?'"

Machine guarding risk assessment also becomes a tool for communication, for planning, for people involvement and for training, he explained.



Siemens Canada officially launches the TIASTAR Motor Control Centre at a ribbon cutting ceremony at the Burlington manufacturing facility: Siemens Canada president and CEO Roland Aurich (left), Mayor of Burlington Cam Jackson, and Siemens vice president of the Industry Automation and Drive Technologies division Joris Myny.

Siemens Canada creates Motor Control Centre

BURLINGTON, ON – At a ceremony with dignitaries, customers and employees, Siemens Canada officially announced that its Industry Automation division has begun production of the TIASTAR Motor Control Centre (MCC) at the Siemens manufacturing facility here (www.siemens.ca). Siemens has invested more than \$2 million in design, retooling and upgrades to the facility to accommodate the new production line.

"This reflects our ongoing commitment to manufacturing in Canada and represents a significant investment for Siemens," said Joris Myny, vice president of the Industry Automation and Drive Technologies division. "Bringing the TIASTAR MCC production line to Ontario also demonstrates our goal of providing our customers with made in Canada solutions."

Siemens TIASTAR Motor Control Centres are typically used in commer-

cial building applications to control the speed of fans and pumps and compressors. In addition, they are commonly used in industrial applications wherever motors are found.

For example, Motor Control Centres are used in automotive plants to control the motors that move the assembly line. The self-contained modular units have electrical components, automation interfaces and features designed to offer motor control, communication, monitoring and protection.

According to Anthony Bezina, the Burlington facility plant manager, "we are using intelligent manufacturing techniques, which include efficiencies in equipment layout and automated solutions to help increase productivity and to become more competitive."

MCCs are assembled using products that meet the globally recognized IEC standard.

Canadian Manufacturing Technology Show



TORONTO – With keynote speakers Linda Hasenfratz, CEO of Linamar Corp. (left) and Dick Morley, a consultant with R. Morley Inc. and father of the PLC, the Society of Manufacturing Engineers-sponsored (www.sme.org) Canadian Manufacturing Technology Show last month attracted many from Canadian industry looking to improve processes from engineering design workflow to metal fabrication. Anticipated as an economic bell weather, many show exhibitors were apprehensive going in but pleased with the quality of attendees that turned out.

News in Brief

Rotator signs Autogard

Rotator Products (www.rotator-products.com) of Woodbridge, ON, has announced it is handling the Autogard (www.autogard.com) line of torque limiters, couplings and torque sensors as a representative in Eastern Canada.

UOIT driving simulation

The Oshawa, ON-based University of Ontario Institute of Technology (www.UOIT.ca), with funding from the Canada Foundation for Innovation and Ontario Ministry of Research and Innovation, recently ordered a real-time driving simulator based on CarSim and TruckSim from Mechanical Simulation Corporation, Ann Arbor, MI. (www.carsim.com).

Electromate adds Zaber

Electromate (www.electromate.com) has signed a distribution contract with Zaber Technologies of Vancouver (www.zaber.com) to sell and service its line of computer controlled linear actuators, linear slides, rotary stages & motorized mirror mounts.

RotoPrecision, Onvio team up in Canada

RotoPrecision Inc., a Mississauga, ON-based provider of precision mechanical components and power transmission products (www.rotoprecision.ca), has announced an agreement with Onvio LLC (www.onviolc.com) of Salem, NH, to offer exclusively in Canada Onvio's line of planetary servo speed reducers, cycloidal zero backlash reducers and timing belt pulleys.



Thomas Lichtenberger of Festo Canada demos a bionic gripper at WorldSkills 2009.

WorldSkills 2009 competition video report

This fall in Calgary, the WorldSkills 2009 competition (www.worldskills2009.com) brought together youth teams from around the world to compete in a variety of categories. Go online to www.dpncanada.com/video to listen to Gary Regal of Autodesk, a WorldSkills sponsor of the Mechanical CAD competition, and Thomas Lichtenberger, president of Festo Canada (right), a Mechatronics and Mobile Robotics competition global sponsor, as well as competition experts.

Calendar

January 31-February 3, 2010. Anaheim, CA. SolidWorks World 2010 conference is presented by DS SolidWorks for users of SolidWorks software (www.solidworks.com/swworld).

April 19-23, 2010. Hannover, Germany. Hannover Messe (hannovermesse.de)

includes co-located shows Industrial Automation, Digital Factory and MobiliTec (hybrid and electric powertrains).

May 17-19, 2010. Montreal. Montreal Manufacturing Show sponsored by the Society of Manufacturing Engineers (www.sme.org/events).

See more events @ dpncanada.com



The 2009 University of Waterloo team at the Michigan Formula SAE competition.

University of Waterloo Formula Motorsports team wins award

Simulation software developer Ansys has announced that the University of Waterloo Formula Motorsports team (<http://fsae.uwaterloo.ca/>) leveraged its software (www.ansys.com) in developing an innovative, award-winning air intake restrictor for a race car engine. The student team used a design of experiments procedure within Ansys software to identify the best design candidates without building a prototype. For its efforts in developing the process, the Waterloo team received the Formula SAE CFdesign Computational Fluid Dynamics (CFD) Award, which recognizes the best implementation of CFD as a design tool.

Products: Enclosures

Bendable light guides



Elma Electronic flexible light guides can be bent in 90° or other angles. This allows the LED to be mounted to a PCB while fixed to a panel at a right angle. The LED mounting can be done in a vast array of positions, locations, around corners or components, etc. They have common sizes of 2 mm diameter, 80 or 150 mm length, and black and clear tube colors. The light guides are customizable and designed for -40° to 85°C ambient temperatures and housings and lens material to UL94 flammability standards.

www.elma.com

Sleeve bearing dc fans



Orion Fans has developed a line of sealed sleeve bearing dc fans. The Challenger series fans feature a patented sealed sleeve bearing system that has a life expectancy of >50,000 h at 25°C. MTBF is in excess of 200,000 h. The sealed sleeve fan technology retains lubricant by using metal foils that serve as a guard to redirect and recycle the lubricant. The fans are offered in seven sizes ranging from 40 x 10 mm to 120 x 38 mm, and are available in 12 and 24 Vdc versions. Airflow ranges from 6.7 to 105 CFM. The fans feature a brushless dc, auto restart, polarity-protected motor with a UL94V-0 plastic frame and impeller. The sealed sleeve fans are RoHS compliant.

www.orionfans.com

Control panels and panel PCs



Beckhoff Automation has designed variants of CP6xxx series control panels and panel PCs with modified enclosures to permit simple drop-in after removal of Allen-Bradley VersaView panels from machines and electrical cabinets. Beckhoff 12 and 15 in. displays feature an aluminum front with sheet-steel rear cover, optional touch screen, optional function keys and/or optional alphanumeric keyboard. The front side is rated with IP65 protection and the rear side with IP20.

www.beckhoffautomation.ca

Protection for standard PCs



Rittal stand-alone TS 8 PC enclosures protect internal components against moisture, dirt and high temperatures. Additional use of climate control components ensures that a correct operating temperature is maintained inside the enclosure. The enclosures are also available with a desk section in place of the drawer, a shortened monitor door or a folding support panel. Both the fold down keyboard version and the pull out drawer version do not infringe on the IP rating of IP55 even when open.

www.rittal.ca

Easy-close slide mounts



Accuride has introduced the 3832 Easy-Close, a 100-lb, full extension, side mount slide designed to bring drawers to a smooth close. The 3832EC is said to be an affordable upgrade to installations where safe and quiet operation is desirable such as institutional equipment and carts found in libraries and schoolrooms. Units are available in lengths of 14 to 28 in., in clear zinc, black and white finishes. The zinc and white finishes are RoHS compliant.

www.accuride.com

Cast aluminium enclosures

Hammond Manufacturing launched the initial six sizes in the 1550 line of small die-cast aluminium enclosures that are said to provide robust mechanical protection and good EMC attenuation levels. The initially available sizes range from 60 x 55 x 26 mm to 115 x 90 x 51 mm; the largest size in the family, to be introduced later in the year, will be 275 x 17 x 65 mm. Available with a natural or black epoxy powder coated finish, the units are supplied in two versions, standard and watertight.



www.hammondmfg.com

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Spotlight

Sensors



12.5 mm signal conditioners

Pepperl+Fuchs has introduced KC signal conditioners. The 12.5 mm wide footprint KC modules feature a low power consumption that is said to reduce heat output when compared with competitive signal conditioners. Units provide a signal conditioning option in control rooms with limited space in both hazardous areas as well as general purpose locations. www.pepperl-fuchs.com



Profinet compact encoders

POSITAL has announced that its OPTO-CODE rotary encoders with Profinet IO interfaces are now certified for IRT (isochronous real-time) data transfer protocols. The encoders also support RT and NRT (real-time/non-real-time) data transfers. The encoders are 58 mm in diameter and don't require a connection cap, terminating resistors or switches for address allocation. www.posital.com



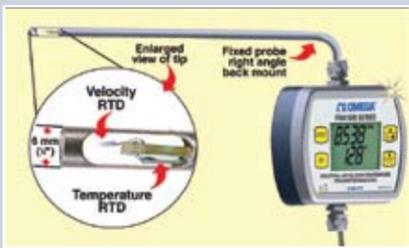
Rotary position sensor

Cherry has introduced the AN9 series dual-output rotary position sensor, an electrically and physically non-contacting device. Its dual output design is said to offer an additional dimension of reliability, allowing a connected controller to diagnose potential problems in the sensing system. The output is programmable, but it is available in output ranges from 0 to 45° to 0 to 360°. www.cherrycorp.com



Long range photoelectrics

Carlo Gavazzi has launched a long range diffuse photoelectric sensor with background suppression technology. The PD112 will detect black objects at distances up to 2 m, and white and grey objects at up to 2.5 m. Using triangulation technology, the sensor can be easily and precisely adjusted, with a 28-turn potentiometer. www.gavazzionline.com



Air velocity/temperature

The FMA1000 series is designed and manufactured by Omega. The product measures and displays air velocity and air temperature of air flows in ducts and pipes. USB serial interface, and Windows-based PC interface software. The device has a sensor probe design based on three RTD elements. www.omega.ca

Photoelectric series adds options

The 14 series photoelectric sensor from Baumer offers a broad variety of connection options and housing features. A transparent rear housing section allows the sensor interior to be readily observed, permitting the power and output LEDs to be viewed from practically any angle. The plug connection has also been optimized with a metal 4-pin M8 connector. In addition to the M8 connector, there is also the option of an M12 connector or a built in 2 m cable. www.baumer.ca



LVDT position sensors

The Macro Sensors HLR 750 series of 3/4 in. diameter LVDT position sensors are suitable for predictive maintenance of gas turbines as part of process controls used to monitor shell expansion and bearing vibration. The hermetically sealed AC-LVDTs are installed on turbine shells. www.macrosensors.com

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Products: Power Transmission

Plastic conveyor chains



Iwis has presented a new range of chains for the beverage and packaging industries. Sold under the Flexon brand label, the newly developed Flat Top chains and modular belts can be used for conveying almost all types of piece goods and are particularly well suited for use in the beverage and packaging industries. With its new plastic chains, Munich-based precision chain systems manufacturer Iwis now offers a comprehensive range of chains for all drive and conveying applications.

www.iwisusa.com

230/460 Vac, 3-phase motors



Bodine Electric Company added over twenty 230/460 Vac, variable speed, three-phase gearmotors and motors to their Pacesetter product line. The models are ideal for factories where various power supply options are present. They provide a wide range of torque, speed, and horsepower to fit a wide variety of applications such as conveyor systems, packaging machines, and factory automation. These highly efficient, variable speed ac motors can help to reduce power consumption and lower production costs.

www.bodine-electric.com

Hollow shaft gearmotors



Bison Gear & Engineering Corp. has added 46 models of its 562 series of hollow shaft offset gearmotors to its growing FlexTorqT line of products. With a slightly larger footprint than a conventional right angle worm reducer gearmotor, the FlexTorqT units are said to provide from two to nine times more output torque, depending on the gear ratio utilized. The gearmotors are offered in seven 115 V, single-phase 1/20 hp versions and thirty nine dc versions with 12, 24, 90 and 130 V inputs and powers of 1/8 and 1/20 hp. Continuous output torques range from 7.5 to 124.3 Nm, with corresponding fixed output speeds from 65 to 1.3 rpm.

www.bisongear.com

Anti-backlash leadscrew

igus' DryLin SLW Pre-Loaded uses anti-backlash nuts to reduce axial clearance and is also fitted with DryLin W 'turn-to-fit' linear bearings, which offer adjustable radial clearance. The unit is said to be less expensive when compared to ball bearing assemblies. DryLin SLW Pre-Loaded units feature high torsional stiffness, are lubrication-free and contaminant-resistant.

www.igus.com



Gearheads in 5 frame sizes



Thomson has introduced XTRUET True Planetary Gearheads. Available in 40, 60, 80, 120 and 160 mm frame sizes, the gearheads are engineered to move large loads more easily and quietly with True PlanetaryT gearing through improved load capacity and lower backlash. Units deliver 13 arc min operation, with torque capacity up to 876 Nm and ratio availability of 3:1 through 100:1.

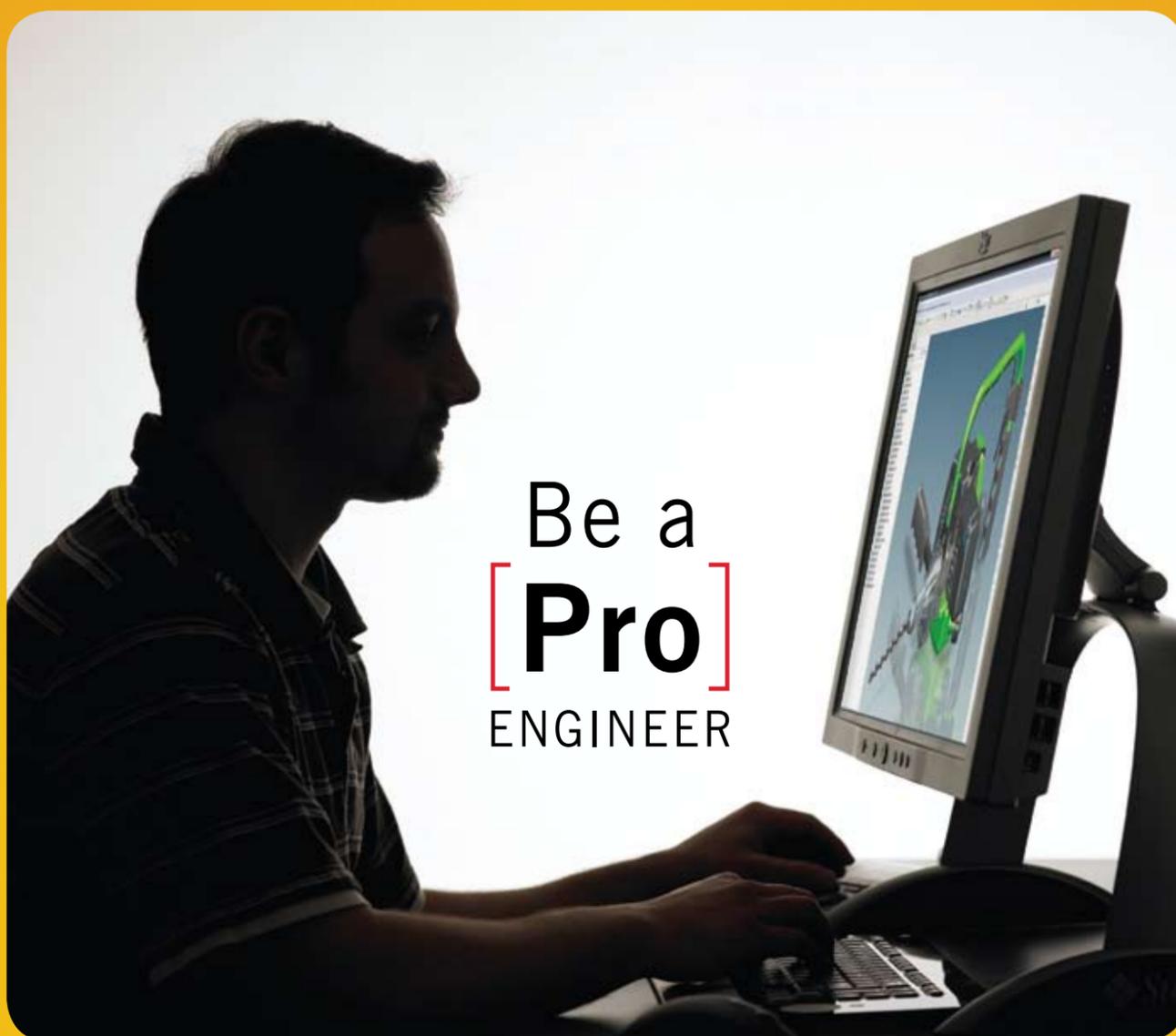
www.thomsonlinear.com

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Wittenstein offers servo gearboxes with specifications for washdown environments. Available nickel plated, lacquer coated or in stainless steel, Wittenstein's washdown range of servo gearboxes include IP65 protection, food-grade grease and stainless steel components.

www.wittenstein-us.com



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Feature: Power Transmission

Plastic bearings offer freedom from maintenance

High-performance plastic bearings have emerged as a viable, cost-effective alternative to metal or bronze bearings. Advanced synthetic compounds offer more design opportunities than traditional materials.

Plastic bearings provide better vibration dampening and are lightweight and self-lubricating. They are also corrosion-free, which means they will not fail when exposed to chemicals, water or salt.

The freedom from maintenance and external lubricants that plastic bearings offer can lead to many economic and environmental advantages. For these reasons, many agricultural equipment manufacturers have made the switch to plastic bearings.

Rogers Sprayers of Saskatoon, SK, manufacturers enclosed drift-containment spray booms and sprayers for the golf and turf industry. The devices are designed to be cost-effective and also environmentally safe when spraying chemicals such as herbicides or pesticides on turf.

The company offers two types of sprayers – the Windfoil and the Falcon – that each use up to 30 iglide plastic plain bearings from igus at various pivot points to prevent metal-on-metal contact. In the past, Rogers Sprayers had employed nylon bushings, but made the switch to plastic bearings for a number of reasons.

In the past, the company had employed nylon bushings, which expanded when exposed to moisture. This resulted in fre-



quent maintenance or premature failure and in turn, numerous service calls from customers. Plastic bearings eliminated this problem because they boast extremely low moisture absorption and are corrosion-resistant, making them able to withstand continuous exposure to the water and chemicals used during spraying.

It was also important that the bearings had a low coefficient of friction and did not require any grease. Self-lubricating

The Falcon type sprayer (shown) from Rogers Sprayers, along with its larger Windfoil type, each use up to 30 iglide plastic plain bearings (inset) from igus at various pivot points to prevent metal-on-metal contact.

“The **economy** has taken its toll on **our suppliers**

causing me to lose some really great partners. I was worried about connecting with new suppliers I could depend on ... until I found MFG.com.”

–Buyer, NY

plastic bearings contain solid lubricants embedded in millions of tiny chambers within fibre-reinforced material. During operation, the bearing transfers small amounts of the lubricant onto the shaft to help lower the coefficient of friction. With grease eliminated from the equation, the sprayers can operate on terrain without seizing or failing due to ingress of dirt and dust and users never have to worry about unsightly grease stains on the turf.

“iglide is a cost-effective, off-the-shelf solution for us,” said Merv Bilinski, owner and president of Rogers Sprayers, “The bearings come in contact with dirt, water and chemicals, and still deliver a superior performance to other solutions we’ve tried. We also like the fact that the bearings aren’t an eyesore – they look good on our machines.”

Another company in Ontario, which manufactures reel mowers for the turf industry, also needed a bearing that required no greasing and would be unaffected by harsh fertilizers and moisture. igus’ plastic bearings are used in multiple mowing heads on the reel mowers and enable customers to adjust the cutting height. An adjustable rod threads through a flange bearing mounted to the frame. The bearing enables smooth, uninhibited rotation and also dampens the vibrations caused by the mower’s rotating wheel.

Similarly, a U.S. manufacturer of agricultural machinery was able to increase service life by 500 to 600% and reduce costs by up to 80% by replacing bronze bearings with iglide J plastic plain bearings in its potato planters.

Plastic bearings eliminated corrosion and increased lifespan on the planter’s pick arm, which had encountered several problems due to oil-impregnated bronze bearings with graphite plugs. The pick arm rotates through an arc of 15% at a rate of 12-20 cycles per minute.

On the West coast, the bronze bearings were experiencing high wear and premature failure due to very abrasive conditions caused by high levels of volcanic ash in the soil. On the East coast, high salt content in the air caused corrosion and seizure. By switching to iglide J, the company was able to avoid replacing the bearings two or three times a season as it had to do with the bronze.

This article was contributed by igus, inc. www.igus.com/show_bronze.asp

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Output torques to 159,300 lb-in.



K-SERIES

Helical-Bevel Gearmotors

SEW-Eurodrive's K-Series right angle helical-bevel gearmotors deliver maximum performance and reliability with 95%+ efficiency and high torque density. Durable gearing designed for long service life makes this drive an ideal choice for demanding around-the-clock applications.

K-SERIES PRODUCT RANGE

Power ratings from 0.05 to 615 HP
Output speeds from 0.05 to 326 rpm (based on 4 pole motor)
Output torques to 442,500 lb-in.



S-SERIES

Helical-Worm Gearmotors

SEW-Eurodrive's S-Series right angle gearmotors offer helical-before-worm gearing combining durability with power-packed performance in a compact design that requires no motor belts or couplings.

S-SERIES PRODUCT RANGE

Power ratings from 0.05 to 46 HP
Output speeds from 0.05 to 257 rpm
Output torques to 35,400 lb-in.



AC MOTORS
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SEW-Eurodrive's squirrel-cage motors and brakemotors deliver exceptional performance and reliability combined with low maintenance. Designed for continuous duty under tough service conditions, these low-noise brakemotors are used wherever fast, safe braking is a major application requirement.

AC MOTORS PRODUCT RANGE

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2-, 4-, 6-, 8-, 4/8-, 2/6-, 2/8-pole plus others
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SEVERE DUTY CORROSION PROTECTION

SEW-Eurodrive has introduced a new line of aseptic gearmotors to meet the high levels of hygiene crucial to the production of food and beverages, as well as the stringent demands of the chemical and pharmaceutical industries. SEW has solved this challenge with the aseptic design of helical, parallel shaft helical, helical-bevel and helical-worm gearmotors made entirely of smooth stainless steel, cooled by pure convection cooling – eliminating conventional fan and cooling ribs, which prevents the build-up of germs and bacteria on the surface and allows for easy regular cleaning.

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While hollow shaft mounting systems offer advantages over traditional securing methods, they're extremely susceptible to corrosion. As a result, getting a gearbox off the shaft is difficult, often impossible. The revolutionary TorqLOC makes things easy for a change.

TorqLOC is a compact, keyless hollow shaft mounting system that offers manufacturers operating in wash-down environments an unrivalled solution for coupling drive systems to their machinery.

With a keyless design that fits a variety of standard shaft sizes without additional machining, TorqLOC reduces operating costs and allows simple, fast assembly by eliminating the need to cut keyways or turn solid shafts to exacting tolerances.

Made from bronze and nickel-plated steel, TorqLOC's tapered bushings are inherently corrosion-resistant, making the system ideal for wash-down environments. And with no corrosion problems, TorqLOC ensures fast and easy removal, even after years of use.

With a flexible mounting system and corrosion-free components, you now get off and on easy with TorqLOC.

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Feature: Enterprise CAD

Take advantage of Web-based file sharing

By Lee Garf

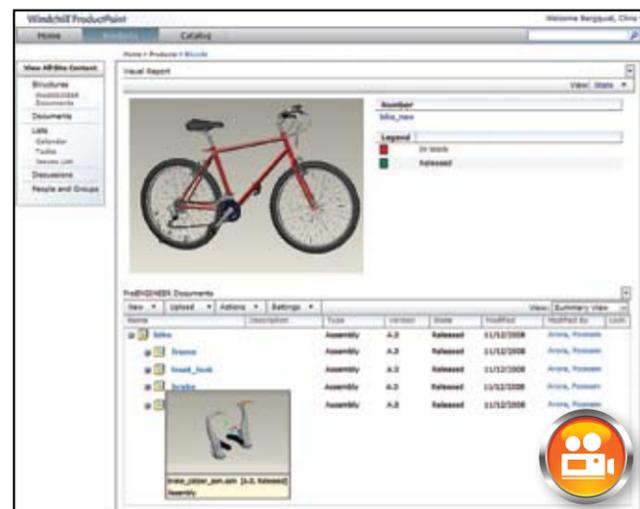
For small and medium enterprises, or SMBs, CAD collaboration poses unique challenges. A product from an SMB has to be just as sophisticated as competing products from larger companies. Similarly, the development processes supporting that product have to be on par with those in the larger companies. This means

that the smaller company's product-development infrastructure will be competing along with the product itself.

The product may require a global design team with offshore manufacturing; it may need integrated mechanical and electronics subassemblies; and it may need to be re-designed, or at least updated, every six months. These needs must be supported by the infrastructure. The larger company is almost certainly going to have

a product data management (PDM) repository to manage file versioning and team collaboration; the smaller company may not. The more complex the product, the greater the difficulty SMBs will experience in conducting effective collaboration.

Collaboration, and in particular, file sharing – is key to competing through product-development, yet most SMBs are using less than adequate tools for sending and sharing files. Some work by email; others use shared network folders or FTP sites. Each pres-



A typical PTC Windchill ProductPoint product home page. ProductPoint is based on Microsoft's SharePoint technology.

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ents significant problems:

- Search – Searching for a part from memory or by part number is a hit or miss proposition. A usable part file may or may not be identified based on the quality of the CAD database.

- Naming – Without an automated naming mechanism, smaller companies are forced to track all design changes manually, and to create an effective naming system for parts and assemblies.

- Versioning – Different users may be working on different components of the same assembly at the same time, so it is critical to keep track of the versions of files as they are checked in and checked out of the central repository. It should be possible to roll versions back, because changes to one part may affect how other components function within the assembly.

- Conflicts – Without a multi-user conflict-resolution framework, shared files run the risk of introducing redundancy and errors into product designs, since it's possible for multiple users to make conflicting changes simultaneously.

- Robustness – A part file may have relationships to five thousand other parts that make up a single assembly, and an assembly may have relationships with other parts and other assemblies. A CAD designer (or engineer) should be able to see at a glance all dependencies of the part he or she is working on. For standard email, shared network folders, and FTP sites this is impossible.

For the millions of users who have already adopted it, Microsoft's SharePoint technology is bringing Web services to content management applications. SharePoint's feature indexed search and other office-collaboration functions, but they stop short of satisfying the demands of CAD file sharing and collaboration.

What's needed, and what is now available, is file-sharing software that can extend the capabilities of SharePoint for use with CAD-specific applications. This software, called Windchill ProductPoint by PTC, helps create a CAD collaboration infrastructure that can rival the product-development abilities of PDM-equipped companies.

Windchill ProductPoint employs a robust versioning and mapping engine that tracks design histories and changing file dependencies. The software automatically increments new file versions, but otherwise lets companies implement their own file-naming schemes. A CAD-specific search engine makes it easy to find parts and assemblies.

Lee Garf is Vice President Product Management, PTC.
www.ptc.com

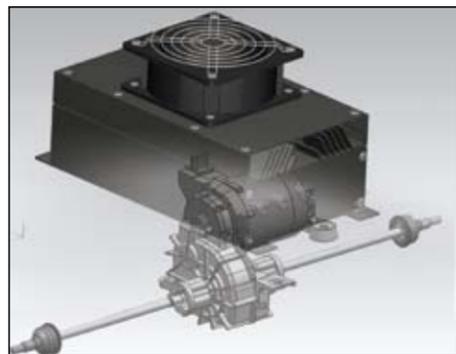
Feature: Enterprise CAD

Converting a Saturn to improve life on planet Earth

The University of Ontario Institute of Technology (UOIT) is one of 17 North American Universities participating in EcoCAR: The NeXt Challenge, a three-year engineering competition established by the U. S. Department of Energy and General Motors, and managed by Argonne National Laboratory.

The competition challenges the participants to reduce the environmental impact of vehicles by minimizing fuel consumption and reducing emissions while retaining the vehicle's performance, safety and consumer appeal. Students use a real-world engineering process to design and integrate their advanced technology solutions into a 2009 Saturn Vue.

UOIT's EcoCAR team is turning the gasoline-powered Vue into a full-function electric vehicle. Such a dramatic transformation posed a number of engineering challenges for the students, including designing and integrating a fairly large onboard energy storage system (ESS) into the competition vehicle. To qualify for the project and receive an actual vehicle, the team had to demonstrate the validity of its concept through virtual simula-



Shown is the dc/dc converter (top) and new position for the electric motor (bottom), both created in NX software from Siemens PLM Software.

tions. GM supplied a digital model of the Vue and the UOIT team used the NX product development application from Siemens PLM Software on three main areas of the ESS: wiring layout, thermal management and structural component design and mounting.

The proposed ESS required high-voltage wiring running the length of the battery tray. The limited amount of space made wire routing a challenge. "It would have been difficult if not impossible to do this work using 2D routing diagrams and engineering drawings," said Nicholas Shopian, an automotive engineering student at UOIT and an EcoCAR team member.

"A three-dimensional digital model and the NX quick connect tool provided a rapid way to set up several points and generate a wiring path," Shopian continued. "This made it relatively simple to see the high voltage lines laid out inside the ESS module. With the wiring laid out, it also allowed for several necessary changes to be seen, enabling the wire routing to safely clear all obstructions. The electrical routing tool proved invaluable when generating a wiring design. Using the routing tool and with all of the other systems in their place, it was possible to ensure any one system would not overlap and that the proper clearances were maintained."

To maintain the ESS at the correct operating temperature, the team had to find a way to extract internal heat build up and supply heat to the system if necessary. The proposed thermal management system

encloses all the batteries with small Teflon or nylon cooling tubes. A system of this nature was very hard to visualize on such a large scale. Determining the quantity of material necessary for construction was another problem.

The students used the software to design the thermal management system around a central supply line and one main return. Routing software was used to construct the individual battery cooling system using the NX mechanical routing application's quick path tools. This application allowed for easy layout of the main

path, and for several iterations to be made to generate the entire system. The software was also helpful for avoiding interference so the various systems fit together.

Said the co-leader of UOIT's EcoCAR team, Mike Maduro, "we are basically redesigning a vehicle. It would be extremely expensive to do packaging studies by putting rapid prototypes together, and it would probably take six months to a year. Using NX, we are doing packaging studies in weeks, even days."

A final area where the NX suite of tools has been helpful to the UOIT team is in

quickly making design modifications, such as those required in response to contest rule changes. One recent change involving ground clearance could have been disastrous for the UOIT team, whose battery pack fits below the vehicle.

"We had to basically move everything up an inch," said Maduro. "Without the ability to easily modify an assembly in NX, that would have been impossible."

This article was contributed by Siemens PLM Software.
www.siemens.com/plm

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Technical Literature

Industrial Ethernet. HARTING North America has announced its *Industrial Ethernet Handbook*, a 5-chapter, 168-page handbook that covers the technical details of Ethernet, comparing it to other fieldbus systems, and explaining its Open System Interconnection (ISO/OSI) Reference Model. www.chartwell.ca

Slides. Slide product manufacturer Accuride International has released a 36-page catalog of products organized into 6 different sections: slides for electronic enclosures; light duty, medium duty, and heavy duty slides; specialty products; and the 20 series pocket and bayonet mount slides. www.accuride.com

Manufacturing management. *The Hitchhiker's Guide to Manufacturing Operations Management: ISA-95 Best Practices 1.0* on CD-ROM from ISA presents "best practices" others have implemented that have resulted in dramatically lower total cost of ownership (TCO) for manufacturing IT architectures and manufacturing, as well as reduced supply chain operational costs. www.isa.org/isa95guide

Blowoff, cooling products. The 160-page *Catalog 23* from Exair features products that can help conserve compressed air and reduce dangerous noise levels. www.exair.com/catalog.htm

Single axis actuator. Misumi USA has announced its *2009 Single Axis Actuators Catalog*, featuring single axis products and components suitable for a wide range of motion control and assembly machinery and other automation devices. www.misumiusa.com

Miniature motion. Portescap has introduced a 290+ page product catalog featuring miniature motion solutions such as its brushless and brush dc motors, TurboDisc, CanStack, CanStack vector and hybrid stepper motors, gearheads and encoders, as well as drives and electronics. www.portescap.com

Surge protection and filtering. SolaHD has introduced *Enduring Protection*, a 28-page catalog on surge protection devices, active tracking filters, and data/signal line surge protectors. www.solahd.com

Powder metallurgy auto parts. The Metal Powder Industries Federation (MPIF) has announced the *PM Automotive Parts Catalog*. Information is included on specific PM parts applications in North American, European, and Asian light vehicles under three categories: engine, transmission/trans-fer case, and body/chassis. www.mpif.org

Instrumentation and control. Dwyer Instruments has announced its *2010 Catalog* – 600 pages covering instruments for measuring, transmitting pressure, flow, air velocity, level, temperature and humidity. www.dwyer-inst.com/literature.cfm

Pumps. Heypac Inc. has announced its 16-page color catalog for its air-driven hydraulic pumps and power packs. www.heypac.com

Aluminum extrusions. The Aluminum Extruders Council (AEC) has released its *2009-2010 Buyers' Guide* as an online flip-book. www.aec.org

CAD Industry Watch

SolidWorks 2010 tackles sustainability

By Bill Fane

For its 2010 product release, Dassault Systèmes SolidWorks deviated from past practice. Instead of hosting a mass media event, reviewers were flown to SolidWorks's offices in Concord, MA, individually for one-on-one sessions.

During my session, Jeremy Regnerus, Product Manager for DS SolidWorks, stated that there were very few "wow" features in SolidWorks 2010 and that they had focused their efforts below the water line where things don't show directly. Major development efforts have gone into making SolidWorks 2010 (www.solidworks.com) faster, more stable, and more reliable.

Okay, Regnerus may have stretched the truth a bit when he said that there were very few "wow" features.

SolidWorks 2010 adds the "SustainabilityXpress" module. Begin by designing a part as you normally would, and specify a material for it. Now specify where in the world the part is to be manufactured and where it is to be used. SustainabilityXpress then analyzes everything and produces several environmental impact reports. Background data used in the evaluations starts from producing the raw material through producing and using the part and ending up with its eventual disposal. It even factors in the ship's engine emissions if the part crosses an ocean.

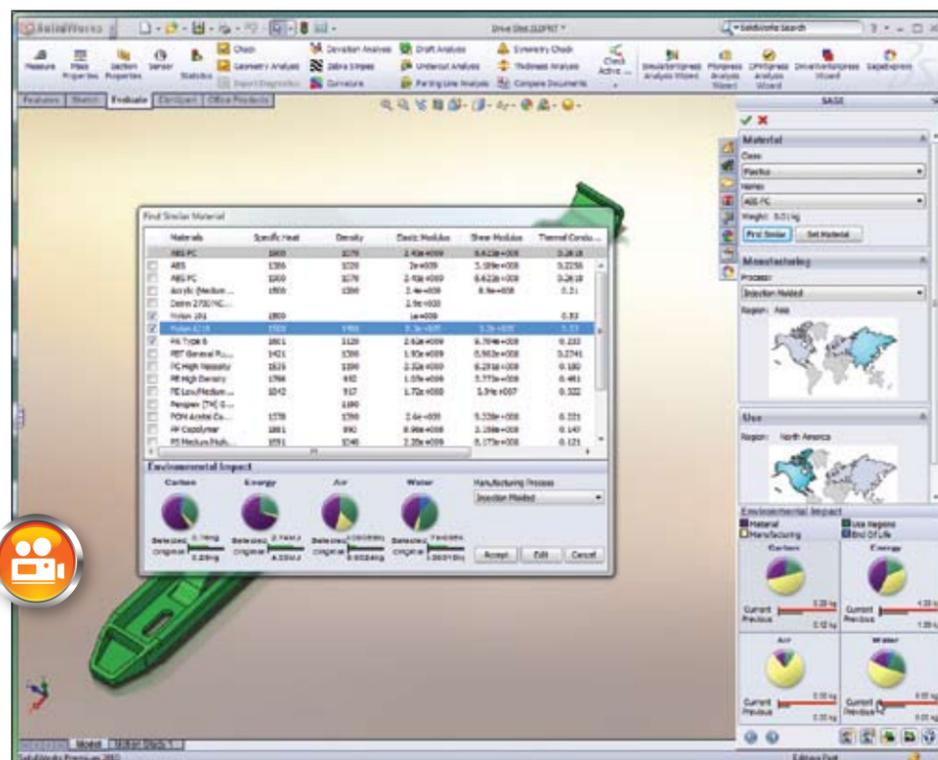
The actual numbers produced in the evaluations are probably not as significant as the fact that it is very easy to vary the parameters and play "what if" games in order to reduce the total environmental impact. To this end SustainabilityXpress also includes a "Find Similar Material" functionality. If you specify a particular material it will try to find other materials with equal or better physical properties but lower cost and a smaller environmental impact.

Regnerus stated that SustainabilityXpress will initially be offered for single parts only, but it will be expanded to include assemblies.

For the new user interface, SolidWorks has introduced mouse-gesturing command selection. All you need to do is to right-click and then drag in one of the four ordinal (N, S, E, W) or four cardinal (NE, SE, SW, NW) directions. This causes a halo of commands to surround the cursor. Highlighting emphasizes the one you are about to select. You can customize the mouse-gesturing interface to suit your own preferences.

If you receive "dumb" 3D solids exported from other 3D CAD applications, then SolidWorks 2010 includes additional support for direct editing of them. In a bit of a bizarre twist, however, it still doesn't offer direct support for native CATIA files even though the same parent company owns both programs. Fortunately there are several third-party applications that can handle the conversions.

I love an interesting new functionality added to SolidWorks Simulation. Actions in a motion simulation do not have to be purely time-driven, but they can now be triggered by specific events. For example, a hydraulic ram will extend until it triggers a photoelectric switch, which will then actuate a gripper mechanism, which in turn activates a rotator, which operates until it hits a limit switch causing the



The SustainabilityXpress module in SolidWorks 2010 permits designers to specify where in the world the part is to be manufactured and where it is to be used. It then analyzes everything and produces several environmental impact reports. Four environmental impacts are measured: carbon footprint; total energy consumed; effect on air; and, effect on water.

gripper to release. To really put the icing on the cake, the sequence data can easily be exported for use in programming PLC control units.

The Create Property Manager dialog box has been renamed to the Configuration Publisher. Okay, that's not quite true. It is probably more accurate to say that the Configuration Publisher has replaced the Create Property Manager. You can use it to create alternate configurations of assemblies and then publish them to 3D ContentCentral. Now your customers can log in to 3D ContentCentral and select the options they want to get the assembly vari-

ant that suits their needs. This is obviously much simpler to set up and to use than the older brute-force method of pre-building every variant.

SolidWorks Enterprise PDM adds improved management capabilities. Heading the list is the capability to set up master configurations and then push them directly down onto client machines on a network without having to configure each machine separately.

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

Low-cost raster to vector conversion

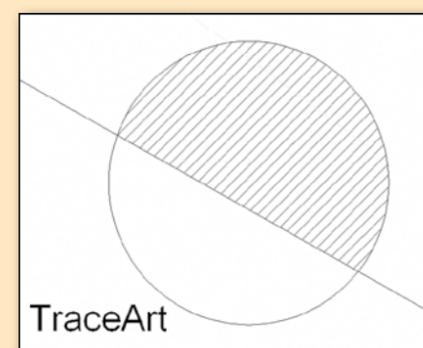
Although there are many different file formats, there are really only two kinds of graphic image in the computer world; raster and vector. A raster image is composed simply of a series of rows and columns of coloured dots. The dots might happen to be placed so that they look like a diagonal line, but the line cannot be moved or changed. This includes formats such as BMP, JPG and TIFF.

All CAD systems use vector formats, wherein a line is a line and has a start, an end, and lives on a specific layer. These values can all be edited.

So what happens if you get a raster image of a drawing and want to edit it? You can't unless you can turn it into a vector file. The brute force method is to insert the raster image into your CAD drawing and then to trace over it.

Acme TraceArt from DWG Tool Software can help with the conversion. A trial copy can be downloaded from www.dwgtool.com.

The basic operation of the software is very simple. You start by opening any one of the five most common raster file formats, or if you only have a paper



TraceArt translates a raster scan of a drawing into a DXF vector file.

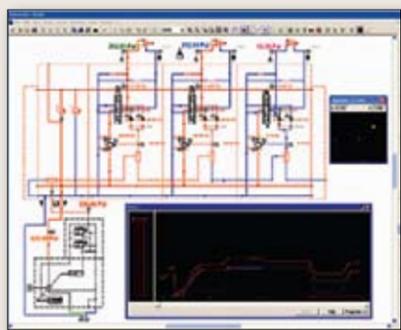
copy you can import directly from a scanner. Next, you tell it to Trace the file. This produces a series of vector objects superimposed on the raster image. You may need to adjust several operating parameters and then repeat the Trace operation in order to get the best results.

Finally, you Save the vector file in a generic DXF format. This can be opened by most CAD programs.

No, it doesn't produce a "best practices" perfect CAD file, but for the price, TraceArt could be useful in many applications.

CAD Chronicle

Engineering system design, simulation



Famic Technologies Inc. has announced Automation Studio V5.7, a software package for electrical and fluid power system design, simulation, project documentation and training. The introduction of a one-line diagram editor for electric power systems increases versatility for projects of all sizes, the company says. The new version also includes better connectivity with external applications such as ERP and other simulation environments. Vendor specific catalogs are now available, including pump configuration tools.

www.automationstudio.com

Application enables 3D model/photo mash-ups

Dassault Systèmes has launched 3DVIA Mobile, an iPhone and iPod touch application that allows users to search, share and interact with a growing library of 3D models on www.3DVIA.com. iPhone users may select, spin, pan, zoom and inspect 3D models in real time. 3DVIA Mobile further enables iPhone users to enhance, or “augment,” photographs with realistic 3D models.

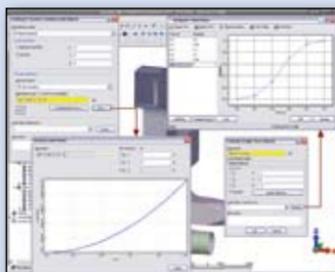
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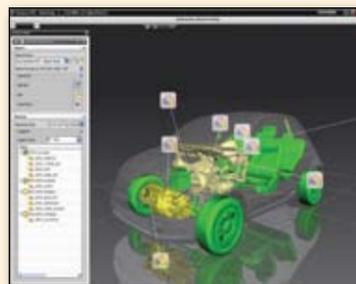
Mechanical simulation software and modeling

Autodesk has announced that it has reached a key milestone in its integration of recently acquired Algor software with the release of the Autodesk Algor Simulation 2010 products. Finite element modeling tools and built-in material libraries within the simulation software allow users to study initial design intent and accurately simulate the behavior of a digital prototype. Additionally, the software supports direct, associative data exchange with most CAD software tools, so users can collaborate and make iterative design changes without having to redefine simulation data.

www.autodesk.com/algorsimulation



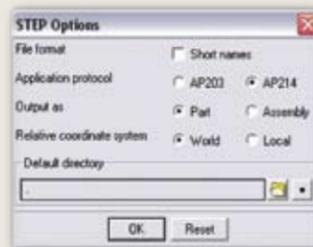
NX adds PLM flexibility



Siemens PLM Software has released of the NX 7.0 version of its software and introduced HD3D, an open and intuitive visual environment to help global product development teams access different types of PLM data. The application includes enhancements to synchronous technology – CAD/CAM/CAE software – that will further accelerate a variety of product development tasks.

www.siemens.com/plm

VX upgrade features new STEP translator



VX Corp. has announced the release of the v14.01 upgrade to VX 2009. In addition to a completely new STEP translator, v14.01 has several GUI, modeling, drafting and machining enhancements. The STEP translator supports AP 203 and 214. The upgrade also provides improved support of primitive surface types on import and export, helpful for detailing and assembly mates.

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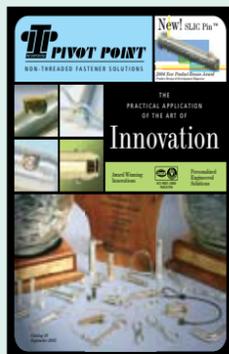
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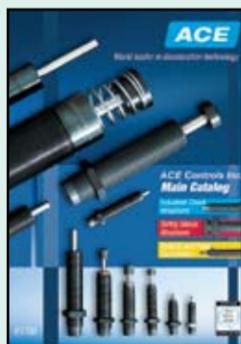
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Medical Engineering

Testing for viruses against the speed of travel

By Mark Sunderland

There was a time when physicians were almost entirely dependent on experience and intuition for the diagnosis of a patient. Conclusions were drawn from what could be seen, heard or felt – and if the findings were corroborated by what the patient was able to say, the conclusion was pronounced and the remedy was prescribed.

Today, the sophisticated technology of modern medicine is merely an adjunct and the diagnostic process must continue to be tempered by the physicians experience and intuition.

Unfortunately, modern technology has changed the rapidity with which infections can travel. A virus that could once, so long as the carrier didn't gallop off in all directions, be confined to a settlement can now land on all continents in a matter of hours, thereby transporting a parochial menace to pandemic proportions with a subset of mutations.



MedMira's FDA-approved rapid HIV test provides highly accurate test results in just 3 minutes.

Modern medical science has made tremendous strides in the diagnosis and treatment of disease but since many serious diseases start with vague symptoms or even no symptoms at all, accurate and rapid diagnosis is the first and most important precursor of treatment and control – and this is now possible. MedMira Inc. (www.medmira.com) of Halifax, NS, is a leading developer, manufacturer and marketer of rapid diagnostic technology and solutions for the worldwide medical community.

The company's test kits provide hospitals, labs, clinics and individuals with reliable, rapid diagnosis for diseases such as HIV and hepatitis C in just three minutes. The tests are sold under the brand names Reveal, MiraWell, MiraCare and Multiplo in global markets. Its rapid HIV test is the only one in the world to achieve regulatory approvals in Canada, the United States, China and the European Union.

In modern times, one of the most insidious health menaces to hit our planet is HIV/AIDS or, in full, human immunodeficiency virus /acquired immunodeficiency syndrome and, in short, it is basically virus/consequence. The virus causes the condition in humans that results in the breakdown of the immune system and this can be both physically and psychologically devastating. It is transferred through blood, semen, vaginal fluid and breast milk – usually through unsafe sex and contaminated needles but it can also be transferred from an infected mother to her baby.

In the frenetic life of healthcare workers, the risk of infection is a major concern and the uncertainties that stem from an injury by an infected instrument are the cause of terrible anxiety. So, with decreasing

budgets and resources, they require high quality rapid tests that deliver efficiency in every way, from performance to results. For this reason, MedMira is delivering a new class of Multiplo rapid tests with the unique capability of enabling multiple results on one test device with just one drop of specimen,

The most likely infections that stem from injury are HIV and Hepatitis B (HBV) and C (HCV). These are serious infectious diseases with similar modes of transmission, through blood and other body fluids. Approximately 33% of people living with HIV are co-infected with HCV.

Co-infection is the leading non-AIDS cause of complications and death in HIV infected patients, with some research indicating that HCV progresses eight times faster in co-infected individuals rapidly developing into cirrhosis, liver failure, liver cancer or end-stage liver disease.

Traditional testing methods involve specific tests for each virus with a turnaround time of several days and up to a week. A fast, simple and economical, rapid test that delivers multiple results instantly can provide healthcare providers and their patients with critical information required to select the right

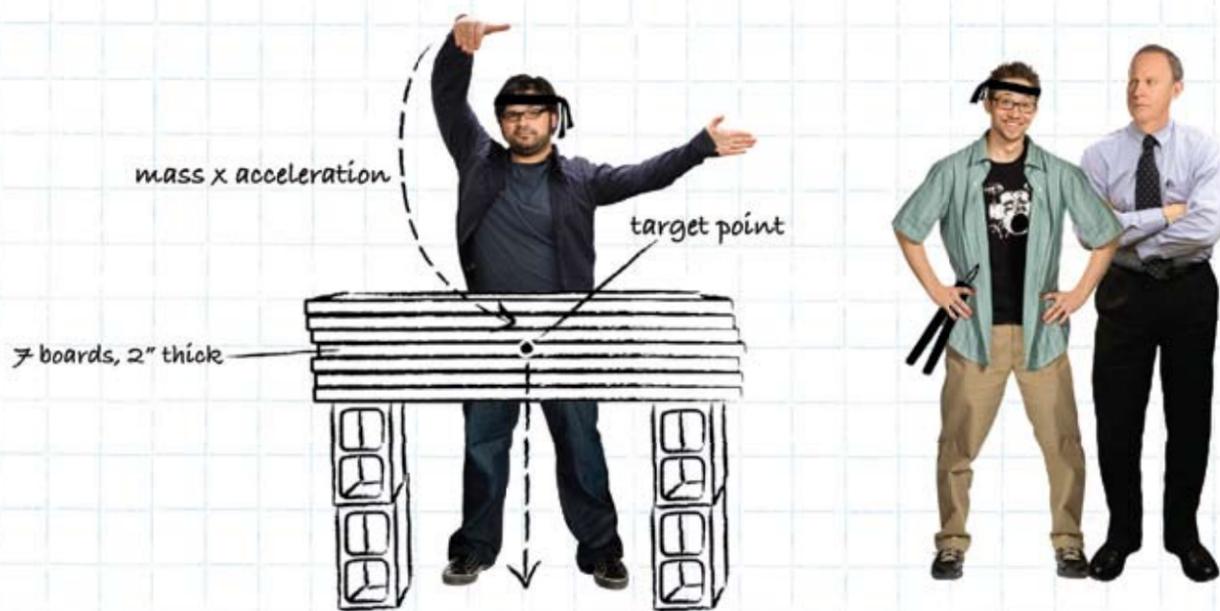
follow-up and treatment plan.

MedMira has developed two multiple rapid tests to answer the increasing need for simultaneous detection of HIV and Hepatitis infections.

Although the foregoing words may have the ring of morbidity and gloom, the essential fact is that there is a positive response - and this is provided by a Canadian product that is effective and valuable in the conquest of disease.

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

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Automotive Scene

Rating electric car "fuel" economy a complex task

By Bill Vance

General Motors highlighted an interesting problem when it announced in August that its 2011 Chevrolet Volt plug-in hybrid electric vehicle (PHEV) will achieve 230 miles per (U.S.) gallon, or 0.98 litres per 100 km. This was greeted with much skepticism. Adding to it was Nissan's imminent pure electric Leaf model (which uses no gasoline at all) for which Nissan claimed an even more astonishing 367 mpg.

It's all very confusing, and reveals

Plug-in hybrid electric vehicles can't be measured the same way as gasoline models

the deliberations going on in the U.S. Environmental Protection Agency (EPA) and Transport Canada (who will likely follow the U.S. lead), about procedures for rating fuel economy of PHEVs and pure electrics.

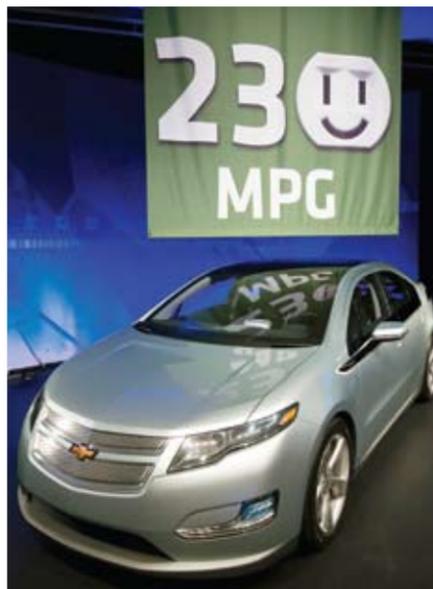
Testing gasoline and diesel cars started in the early 1970s, and in 1977 government agencies began publishing fuel economy figures in preparation for automakers' compliance with U.S. Corporate Average Fuel Economy (CAFE) legisla-

tion. The Canadian government didn't pass similar legislation on the understanding that manufacturers would meet the same standards in Canada. The current CAFE is 27.5 mpg (8.2 L/100 km), and starting in 1911 must rise gradually to 35 mpg (6.5 L/100 km) by 2016.

For testing, cars are mounted on a chassis dynamometer, like a big treadmill, and their wheels rotate a large roller against resistance that simulates road conditions, wind, etc. Highly experienced operators "drive" rigidly specified regimes of starts, stops and speeds displayed on a computer screen. A speed deviation more than 2 mph from the standard nullifies the test.

It was begun for emission testing, and since fuel use is directly related to carbon emissions it was also a handy measure of fuel consumption. Original test speeds and acceleration proved too modest to represent normal driving, resulting in quite optimistic window sticker CAFE numbers. Adjustments over the years have made them more realistic.

Initially there were only city and highway test cycles, but in 2008 to better relate to real world conditions the EPA implemented a five-step procedure which includes higher speeds, more aggressive acceleration, air conditioning use and wider ambient temperature ranges. The five-cycle test becomes mandatory in 2012 and published ratings are arrived at by piecing together parts of each cycle. Until then, manufacturers can continue to



General Motors has announced that its 2011 Chevrolet Volt plug-in hybrid electric vehicle will achieve 230 mpg (U.S.).

use the two-cycle test, but must add EPA adjustments.

Since mpg or L/100 km are familiar and understandable to motorists, they are the preferred sticker numbers for electrics and PHEVs. But how do you rate the mpg equivalent of an electric or PHEV? The Volt gets phenomenal economy (infinity?) for the 60 km GM says it travels on battery power alone, but during a trip of, say, 250 km when the engine will be operating, economy deteriorates to about the level of a Toyota Prius hybrid.

One way to test PHEVs would be to use an average of two runs, one in electric mode starting with a fully charged battery, and one using the engine without battery assist. GM disagrees, saying that since the usual commute is less than 60 km and drivers will plug in each night, most driving will be electric.

Determining gasoline-equivalent mpg or L/100 km for pure electrics is also complicated. One method is kilowatt hours of electricity used per 100 miles and relating it to gasoline energy content. A U.S. gallon is calculated as equivalent to 33.7 kW/h of electricity.

EPA has not finalized its electric car testing protocol, but German automaker BMW is anxious to rate its BMW electric and it and the EPA agreed on a rating of 33 kW-h/100 miles, (102 mpg; 2.2 L/100 km) city and 36 (94; 2.4) highway for its new Mini electric. Tesla arrived at similar figures for its electric. It may prove typical of electric car ratings.

EPA has not finalized the method GM used to rate the Volt, and this was the source of some of the criticism. Scientists and engineers are working hard to develop a fuel economy protocol for electrics and PHEVs that is fair and accurate for manufacturers and motorists.

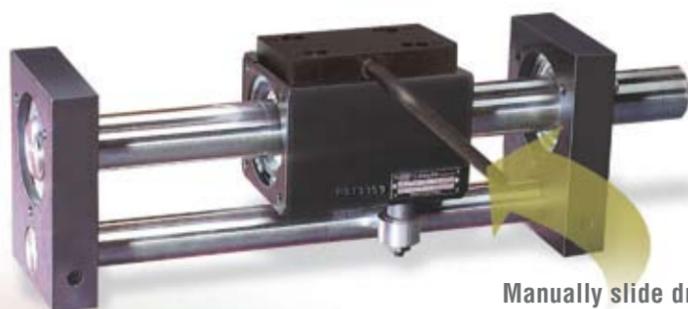
It's not an easy task.

Bill Vance is an automotive journalist and author.

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Advisory Board Directions



Opportunities and challenges in manufacturing today and beyond

By Millan Yeung

Going “Green” and energy efficiency is providing plenty of business opportunities today, but more innovation and R&D is needed to overcome the manufacturing challenges.

Certainly market demands for green products have prompted the automotive and energy sectors to create opportunities for innovative manufacturers. Automotive OEMs are racing to develop vehicles that are lighter, more fuel efficient or using alternative propulsion systems such as plug-in hybrid electric vehicles and battery electric vehicles. Energy suppliers are developing renewable energy sources such as wind turbines, solar panels and biomass-based combustion systems to generate electricity and heat energy.

Consumers are also tending to favor products that are recyclable and contain organic content. Seizing these opportunities, manufacturers are cautiously developing new products to meet these market needs.

To meet the goal of lighter weight

vehicles, composite materials may play an important role. These composites cover a wide range of materials and a large variety of combinations. Their versatility, strength and flexibility made them good candidates for many different applications. With proper design,

Newer, “greener” materials require different machine tool and processing operations in plants

some composite materials can potentially replace a large number of metallic components because of their strength and light weight. Indeed, recent developments have shown that the tensile strength of some carbon-fibre based composite materials is stronger than steel. A convincing example of applicability of composite materials would be Boeing’s use of carbon-fibre reinforced plastic to manufacture the fuselage of its new 787

“Dreamliner” passenger jet.

The use of this type of composites can be extended to produce wind turbines and other high strength structures. For some components, particle matrix composites could provide comparable alternatives for polymers and metals – and they can be produced by molding and casting processes. Universities including University of Toronto, University of Waterloo and Guelph University have developed biomass-based polymer composites for plastic injection molding of automotive parts and components.

The biomass-based polymer composites are mostly made from the combination of plant fibres and particles combined with polymeric binders. The biomass composites introduce the possibility of recycle or organic decomposition of the end products.

Ceramic based metal matrix composites (MMC) have long been a good candidate for replacing steel for high-wear resistance metal parts such as brake rotors. There are many benefits of composite materials yet to be realized. In general, composite materials are versatile, flexible and can be custom designed for specific applications yet potentially recyclable and decomposable.

Opportunities and challenges go hand in hand. While manufacturers want to produce green products and light weight vehicles with composite materials, many found that their traditional manufacturing processes and skills are not applicable for composite materials.

Knowledge, techniques and technologies for the composition and processing are still new to many manufacturing industries. Laying fibre reinforced composites requires additional equipment – such as an autoclave – that is not normally found in

common manufacturing facilities.

Cutting or trimming laminated composites requires strong and high wear resistance cutters and special cutting trajectory. Forming and shaping sheet composites requires special presses and processes such as thermal forming and compressive molding.

Matrix composites require precise formulation and ingredients to meet the needs of specific applications. Injection molding of matrix composites requires special mixing equipment and customized molding parameters including temperatures, injection speeds and holding time.

Machining of MMC castings is different from machining of steel, cast iron or grey iron, and new machining tools and parameters such as special coated cutting tools, rpm, feeds and speeds need to be defined according to the MMC property.

These challenges are met with opportunities for engineers, designers and researchers. Engineers can make use of the characteristics and property of composite materials and tailor them to suit the applications. Designers work with the engineers to define specifications for the finished parts, components and products to meet the requirements of the applications.

Finally, researchers would develop more innovative materials that can meet the challenges of lighter, stronger, recyclable, and decomposable as well as more effective and efficient manufacturing processes.

Millan Yeung is Industrial Technology Advisor, Industrial Research Assistance Program, National Research Council of Canada (<http://irap-pari.nrc-cnrc.gc.ca/>). The opinions expressed in this article are the author’s own and do not necessarily reflect the opinion of the National Research Council of Canada.

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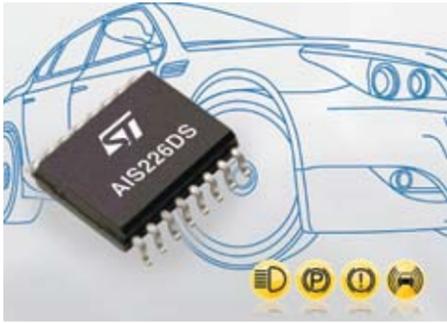
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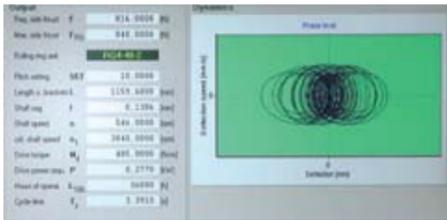
Sensor for vehicle electronics



The AISS226DS motion sensor from ST-Microelectronics is a two-axis, in-plane accelerometer that offers increased accuracy which can't be found with two individual sensors. This feature allows it to accurately measure vehicle movement and in non-automotive applications such as vibration-sensing industrial equipment, inclinometers and robotic systems. The device senses acceleration up to ± 6 g. The sensor can also resolve angles of incline $< 0.02^\circ$.

www.st.com

Software facilitates linear drive selection



UH5 software from Uhing Company is said to enable rapid analysis of linear motion

application requirements to assure correct size selection of Uhing rolling ring linear drives. OEM designers may submit linear motion application data by telephone or using forms online. Based on application criteria such as travel distance, weight of payload to be moved and desired ramp up time, tech support specialists use the software program to calculate required side thrust, linear travel speed and other useful technical and performance data.

www.amacoil.com

Precision linear motor stages



Dover has announced linear motor stages in four models that deliver 25, 50 100 and 150 mm travel. Units provide accuracy from 2 to 8 μm and resolution ranging from 1.0 μm to 5 nm. Each model delivers repeatability to $\pm 0.4 \mu\text{m}$ and is rated for 8 kg load capacity. An integral anti-creep linear guideway can increase uptime by as much as 15% in high duty cycle applications by eliminating the need for homing moves typically required to reset standard crossed roller bearing retainer cages.

www.dovermotion.com

Cost-effective MR2 encoder



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www.portescap.com

Miniature servo motors



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www.wittenstein-us.com

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 336 Transportation Equipment
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 339 Other Manufacturing
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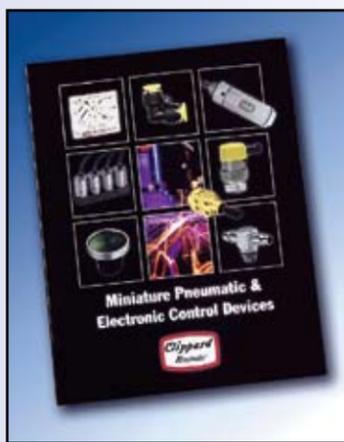
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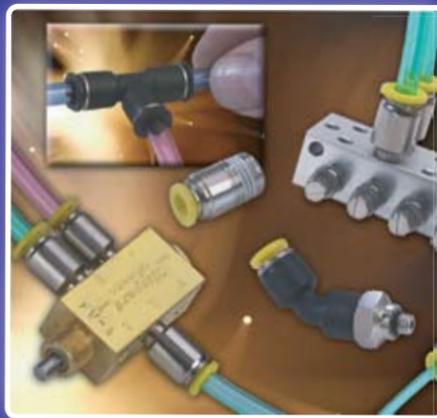
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