

DPN

DESIGN PRODUCT NEWS



January/
February
2009

Covering the total design engineering function in Canada



Multifunctional monitoring

The Novotechnik MAP 4000 Series features include programmable input selection and mathematical functions, as well as up to four limit switches, and analog outputs. Units can perform up to 40 measurements/s.

www.novotechnik.com



Multi-loop PID controller

Watlow has introduced the EZ-ZONE RM – a DIN-rail mounted, configurable multi-loop PID temperature/process controller. Units can be configured with between 1 to 16 modules controlling from 1 to 64 loops.

www.watlow.com



Sub-miniature manifolds

Clippard Instrument Laboratory has introduced a series of sub-miniature manifolds for the 10 mm and 15 mm solenoid valves. The single-sided units are available with 2, 4, 6, 8, 10, 12, 14 and 16 stations.

www.clippard.com/10-15mm

Volume 37 Number 1



PM# 40063602

PAP Registration No. 10773

TecMate refreshes lead-acid batteries

By Mike Edwards



Neglected sealed lead acid (SLA) batteries pose an annual headache for motorcycle, scooter, snowmobile and boating enthusiasts. However, designed-in-Canada desulfater-chargers are available to refresh these deep discharged batteries so owners can get on their way when they first turn the ignition key.

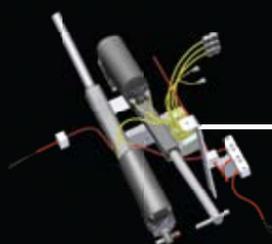
TecMate North America (www.tecmate.com) of Oakville, ON, manufactures a wide range of electronic diagnostic tools and chargers for the 6-, 12- and 24-V battery market. For over a year now, it has contracted Oakville-based product design specialist ORSeS Inc. (www.orses.ca) for mechanical redesign and packaging of its products.

ORSeS services include an experienced industrial design consultancy, through Brad Schilling, its chief technical officer. Schilling has more than 20 years of industrial design experience, including at GE major appliances, and

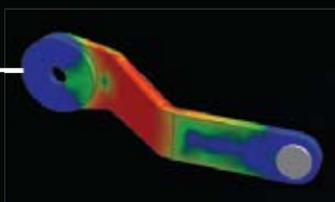
more than 15 years of PTC Pro/ENGINEER 3D modeling experience, including advanced surfacing, sheet metal and plastic package design.

All the external packaging of the products have been redesigned and modeled by ORSeS using Pro/E. The electrical components and PCB design has been done under the supervision and guidance of Martin Human, CTO for TecMate.

According to Mike Cooper, TecMate director of sales in North America, "The new designs have included a number of important design specification changes, which are driven by customer requests. Changes include a varied color scheme and new sealed shapes for the product range and an improved, simpler manufacturing process, which in turn has helped reduce the product costs." Much of this has been enabled due to the use of 3D modeling, as well as the experience of ORSeS.



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autodesk.com/htc

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IronHorse 10 hp cast iron general purpose AC motor, TEFC 215T, 3-phase	\$337.00 MTC-010-3BD18

All prices are U.S. list prices. AutomationDirect prices are from October 2008 Price List.

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5 hp 460V	\$385.00 GS2-45P0		\$965.00 22B-D010N104
5 hp 575V	\$460.00 GS2-55P0		\$1,030.00 22B-E6P6N104

All prices are U.S. list prices. AutomationDirect prices are from October 2008 Price List. Allen-Bradley prices taken from <http://shop.rockwellautomation.com> December 2008. Prices and specifications may vary by dealer and configuration. Prices subject to change without notice. * Includes sensorless vector control - least expensive series with 575V capability.



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In this issue



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Opportunities arise, even in downturn, fluid power professionals learn

John Bachmann, chair of the Canadian Fluid Power Association (above), hosted the CFPFA Breakfast Meeting featuring an analytical keynote address by Jason Myers of the Canadian Manufacturers and Exporters on the state of our economy.



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Navigating the paths to higher productivity with software tools

The Autodesk Inventor 3D solid modeler has helped motion and drives specialist Bosch Rexroth Canada to improve its designs, increase productivity and transition from the 2D drawing environment.



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India's Tata Nano "people's car" aims to provide wheels for the lowest price

Safe, weatherproof, affordable 4-wheel transportation was the goal of Ratan Tata, a philosophy spawned by such cars as the Ford Model T and Volkswagen Beetle, according columnist Bill Vance.



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Festo conference declares energy efficiency as sound economics

International conference in The Netherlands provides insight into finding cost savings through adopting innovation from mechatronics, miniaturization, piezo technology and system technologies.

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DPN DESIGN PRODUCT NEWS

DIGITAL EDITION

January/February 2009



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.



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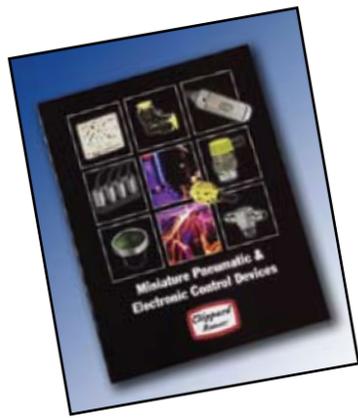
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For the maximum operating efficiency of pneumatic equipment, FRLs are available with port sizes from #10-32 to 1". Filters, regulators and lubricators are available as individual components as well as complete FRL combination units. Some of the many features of this all-new line include various bowl and drain options, large selection of mounting hardware, easy-to-read gauges and sight glasses, and much more.

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NEW! Clippard Full-Line Catalog

Clippard's new 388-page full product line catalog, with technical information, product applications, and more is now available. It includes features, specifications, color photographs, and technical drawings for over 5,000 standard products. It's your complete source for miniature fluid power products. Request your free copy today!

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NEW! Clippard Maximatic® Solenoid & Air Pilot Valves

Clippard all-new Maximatic 3-way, 4-way, single and double solenoid, 3-way and 4-way air piloted valves are available in many sizes and variations for a wide range of applications. Specified, tested and backed by Clippard, these quality manufactured imported valves are available in sizes from #10-32 to 1/2", and pressure ranges from 0 to 150 psig, depending on the valve and model.

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EXPANDED! Clippard Push-Quick Fittings

Clippard's Push-Quick Fittings speed tube insertion for assembling pneumatic circuits. The fittings provide a simple method to connect pneumatic components and accept both flexible hose and rigid tubing. Many configurations, thread options and tubing sizes offered.



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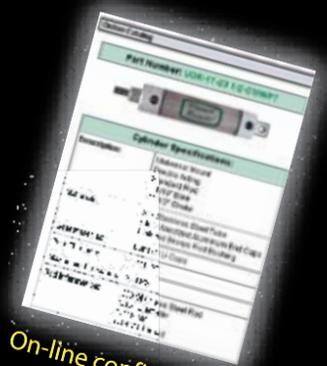


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Renderings



Canada has a way back from becoming just "hewers of wood and drawers of water"

By Mike Edwards, Editor

Have Canada's – and North America's – science and technology sectors become "hewers of wood and drawers of water" for the rest of the world?

According to John McDougall, president and CEO of the Alberta Research Council, "North America is becoming a producer of raw science or early stage technology that we export to the rest of the world at very cheap prices." reports Troy Media Corp. (www.troymedia.com). The sectors, he said, are following the manufacturing sector's historical inability to consistently produce high-value products, "because we don't move (our innovations) along the path to actually turn (them) into products."

McDougall's observations were echoed recently by a reader engaged in new product development for the medical industry. He noticed that a software program mentioned in *DPN* only had mechanical component vendor partners from Europe and Asia, and none from North America.

You don't have to look very far to see how Canada has slipped as a technology world-beater, when Nortel Networks stocks are trading at eight cents per share.

Place emphasis on applied science and commercialization

For McDougall, the answer to ensuring Canadian companies benefit from their innovation lies in sharpening their focus on what he calls the "value proposition" of discovery, that is, placing the emphasis on applied science and the commercialization of new technology. It's not, he cautions, about waiting for the serendipity of scientific discovery to give us the big breakthroughs that change the world.

It's all about innovation, collaboration and foresight, he said: the foresight to recognize problems as they emerge, and collaboration and innovation to solve them, "We need to collaborate to solve the really important problems that we share," he said, adding that that is where organizations like the Alberta Research Council (www.arc.ab.ca/) come in.

McDougall can't stress the importance of foresight enough.

As recently as four or five years ago, he told the energy industry that it must get serious about CO₂ emissions. "They didn't like to hear that, but it was important that they knew it and that they were told. At the end of the day, they actually came to the table with the money to help us come to grips with these problems."

It's not an easy task championing research on issues that are ahead of their time and not yet recognized by politicians, industry or the public, he said.

But it has paid off throughout the history of the council. Dr. Karl Clark initi-

ated research in the 1920s on hot water separation which laid the foundation for today's oil sands industry in northeastern Alberta. Dr. Bill Gunter's research on carbon capture and storage began almost two decades ago. The technology he pioneered was included in the Nobel Prize winning report by the International Panel on Climate Change.

"That's why, in fact," McDougall said, "we can talk about carbon capture and storage today: Because a lot of work was done to try to put the technology in place, to understand how it would work, to do

some experimental work, to get out into the field and try things out and so on."

McDougall recently established a new position at the ARC called the Chair of Foresight to spot emerging trends and channel discovery and innovation.

One of their first collaborative efforts was the establishment of the Jasper Innovation Forum, held in June. Sixty of the brightest people in the world attended the retreat to discuss the fundamentals of life, food, water and energy.

"There was absolute consensus from all parties that there actually isn't a short-

age of food or water or energy in the world," McDougall said. "(But) there is an enormous amount of waste that occurs throughout the world's systems."

This is clearly an opportunity for Canadian companies to step to the fore and reclaim some of our innovation luster.

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



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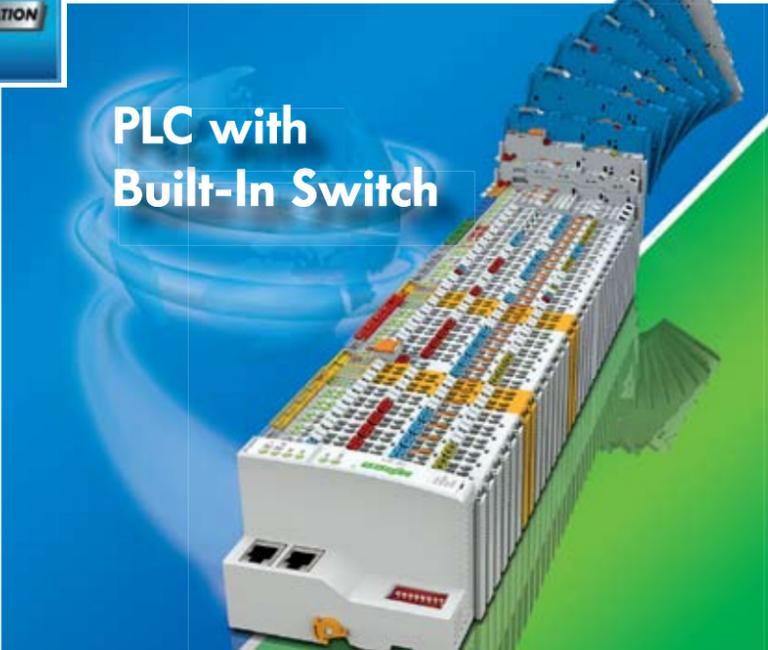
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By Design

Calgary gears up to host the 40th WorldSkills Competition

The city of Calgary will play host to the 2009 WorldSkills Competition (www.worldskills.org), part of a global movement to develop, recognize and inspire young people in the skilled professions. Over its 58-year history, the competition has established itself as the premier showcase for young skilled professionals (aged 17 to 22).

According to David Green, chair of the Global Partner Sponsor Committee of WorldSkills International (WSI), this time teams will be marked on "safety and sustainability."

Every two years, hundreds of young competitors from all over the world gather to compete in their respective fields. Over four days of competition, 1000 competitors drawn from 50 member countries, test themselves against tough international standards and, more importantly, each other. Team Canada is formed of 38 successful competitors participating in 35 contest areas.



David Green (left), chair of the Global Partner Sponsor Committee of WorldSkills International (WSI) and director of marketing, AmPac Region, Fluke Corp., and WSI spokespersons Michelle Bussey and Christine Scott.

The WorldSkills Competition sets world-class standards in 45 skill categories ranging from welding to robotics, mechatronics to industrial electronics, and plumbing to web design.

From September 1 to 7 at WorldSkills Calgary 2009, over 150,000 spectators including students, parents, policy makers, media, employers, teachers, trainers and experts from around the world are expected. To get involved, go to www.worldskills2009.com.



Forty Almac fire trucks featuring Rexroth aluminum framing were delivered to Morocco, and 175 more were quoted for Algeria. The racking area (inset) is a series of shelves found on the side of the fire truck where equipment such as hoses, nozzles and axes are stored.

Aluminum framing adds flexibility to fire trucks

Almac Tank International, a Quebec manufacturer of tanker trucks and emergency motor vehicles, recently selected Rexroth aluminum framing components for the racking area of its custom fire trucks for clients in North Africa.

"Almac was looking for a new way to build the racking areas on its fire trucks, and they wanted an alternative to welded stainless steel," explained Michael Beaudry, technical representative of Bosch Rexroth Canada (www.boschrexroth.ca). "They also wanted a product they could adjust on the fly, allowing them to modify dimensions for customer requirements."

Frank Teolis of Avrex Canada, Inc. (www.avrexcanada.com), the Bosch Rexroth supplier for Lanoraie, QC-based Almac (www.almactank.com), noted that Almac first saw this application on a truck in Morocco and called

upon Avrex to help them find a comparable product in the Rexroth MGE product line.

The racking area is a series of shelves found on either side of the fire truck, and it is used to stow equipment such as hoses, nozzles, axes, and related fire-fighting tools. By employing aluminum framing for this task, Almac was able to save valuable production time previously spent on welding.

"We do a lot of custom jobs, which makes the aluminum framing very useful," noted Michel Henri, plant manager at Almac Tank International. "We can build a bracket or special part without spending a lot of engineering time, and the cost of the profiled rail is about 50% less than welded aluminum or steel."

The framing package includes 45x45L profiles, quick connectors, bolt connectors, sliding nuts and cover profiles.

E-T-A expands automation distribution



RICHMOND HILL, ON – E-T-A Circuit Breakers (e-t-a.ca) has signed 4 new distributors to support the company's growing line of electronic circuit protector products. E-T-A's new Automation distribution partners are as follows: Aztec Electrical Supply of the Greater Toronto area (aztecsupply.com), Electrol Supply Corp. of Surrey, BC, (electrolsupply.com), Les Controles JAD of Drummondville, QC, (controlesjad.com) and Rousseau, Walker & Associates Inc. of Quebec City (rousseauwalker.com). "Our electronic circuit protection line has been growing at a rate that is changing our profile," said Bob Ashmore, E-T-A's general manager (left).

News in Brief

CT Core chooses ORSeS

Rossford, OH-based CAD interoperability application developer CT Core Technologies is has announced that it has chosen ORSeS Inc. of Oakville, ON (www.orses.ca), to represent 3D_Evolution collaboration tool as its value added reseller. The tool includes CAD data exchange translation technology.

Autodesk acquires iLogic

Autodesk, Inc. has signed a definitive agreement to acquire the iLogic software and related technology from Windsor, ON-based Logimetrix Inc. (www.logimetrix.com) iLogic is Logimetrix's desktop rules-based design automation technology.

NSK Canada promotion

NSK Canada (www.ca.nsk.com) has announced that Oswaldo Almeida has been promoted to senior sales manager, where he will be responsible for all aftermarket activities across Canada.



LMI Technologies names new vice president

VANCOUVER – David Snell (left) has joined LMI Technologies Inc. (www.lmitechnologies.com), a Vancouver-based developer of machine vision solutions, as vice president of sales and marketing. He will be responsible for global sales, channels, strategic partner and marketing strategies as LMI continues to focus on specific vertical markets and introduces horizontal market solutions. LMI specializes in machine vision technologies for OEMs and system integrators.

Manufacturing conference calls for productivity

TORONTO – The Manufacturing Technology Network Conference 2008 (www.manutechnet.com) addressed innovation, process improvements and government support programs such as the SMART Program (www.cme-smart.ca/cme) to help small and medium sized manufacturers in Ontario to improve productivity and compete more effectively in the global economy. In one of several sessions, Daffyd Williams (right) of Renishaw Canada (www.renishaw.com) told the Productivity through Process Improvement workshop of the benefits of a "design-for-manufacture philosophy."



Calendar

February 8-11, 2009. Orlando, FL. SolidWorks World 2009 International User Conference & Exposition (solidworks.com).

February 9 & 10, 2009. (two half-day sessions). Troy, MI. CPDA Workshop: Meeting the Challenges of the Downturn without Sacrificing the Future/Immediate Cost

Reduction Approaches to Meet the Challenges of Manufacturing (<https://cpd-associates.com>).

April 20-21, 2009. Toronto. Machine Automation Safety Congress (safermachines.com).

May 5-7, 2009. Toronto. PACKEX Toronto 2009 exhibition presented by the Packaging Association of Canada (packextoronto.com).

See more events @ dpncanada.com



Keynote speaker Jayson Myers, president, Canadian Manufacturers & Exporters (www.cme-mec.ca), and chairman, Canadian Manufacturing Coalition.

Opportunities arise even in downturns, CFPA meeting told

MISSISSAUGA, ON – The uncertain economic outlook featured prominently at the recent breakfast meeting of the Canadian Fluid Power Association (www.cfpa.ca). Keynote speaker Jayson Myers, president, Canadian Manufacturers & Exporters (www.cme-mec.ca), and chairman, Canadian Manufacturing Coalition, told the meeting that the current crisis, while unprecedented, should be looked at in historical context.

"As companies exit the market (in this economy), opportunities arise for those with cash. Hopefully credit issues will also be resolved during this sales downturn," said Myers.



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Spotlight Sensors



Flat pack has noise immunity

TURCK has introduced a noise immune capacitive sensor for level applications. Available in Canada from **Chartwell Electronics**, the BCF10 sensor's small size is said to make it more flexible for mounting in level applications, and it has the ability to detect liquids with high concentrations of chlorides, such as soaps and cleaners. The BCF circuit incorporates a compensating electrode configuration that allows the sensor to detect through film.

www.chartwell.ca

Modular pressure sensor

The MM series pressure transducers from **Omega** offer a modular design that allows designers to construct a pressure sensor which meets application requirements. The series is available in gage, absolute, barometric, vacuum, compound and differential styles, in ranges from 0 to 10 in. H₂O through 0 to 5000 psi. Pressure type, range, units, accuracy, electrical output, process fitting and electrical termination can be chosen from an on-line configurator.

www.omegadyne.com/config/cfg_type.html

Vibration monitoring module

The **WAGO Corp.** model 750-645 2-channel vibration and roller bearing monitoring module (VIB-I/O) tracks machine vibration conditions. Based on the ISO 10816-3 mechanical vibration standard, the module's channels monitor and analyze vibration severity and shock pulse feedback using WAGO's 750-925 Tandem-Piezo acceleration sensor. Mechanical shock pulse process data is transmitted to higher level control systems via fieldbus.

www.wago.us

Ultrasonic level sensors

Gems Sensors & Controls has launched the UCL-520 series of ultrasonic level sensors. The UCL-520 is a two-wire ultrasonic transmitter for measurement up to 8 m and is built with a PVDF transducer for pure, corrosive or waste liquids. The sensor has a minimum 8 in. dead band, offers a 7.6 cm minimum beam width and the selectable display indicates level in air gap or liquid height. The series is pushbutton calibrated with 6-segment LCD display.

www.gemssensors.com



Fluid power pressure

ProSense solid state pressure sensors and transmitters from **AutomationDirect** monitor relative system pressure in hydraulic, pneumatic and vacuum system applications. The units are said to be smaller and easier to install than traditional mechanical pressure switches. ProSense pressure sensing products use capacitive sensing and strain gauge technology.

www.automationdirect.com



Compact photoelectric

The OG-Cube photoelectric sensor from **ifm efector** is said to provide high optical performance in a compact metal housing. The sensor offers position detection and features metal M18 mounting threads designed not to strip during mounting and its standard M12 connector resists high torquing. LEDs indicate operating status (power and output). Models are available with pushbutton setup and an adjustable sensing range from 15 to 200 mm.

www.ifmefector.com

IO-Link distance sensors

Baumer has announced an expanded range of IO-Link products, from small optical switches up to ultrasonic and inductive distance sensors. IO-Link is the new standard in the lower communication layer supported by leading automation and sensor manufacturers. An IO-Link sensor transmits standard digital or analog output signals and provides an additional serial data communication with the control unit as master to exchange parameters such as the sensitivity, time delay and operating mode.

www.baumer.ca



Universal signal conditioners

Red Lion Controls has introduced the IAMS series of universal signal conditioners. The DIN rail mounted signal conditioners provide signal isolation and the universal input can accept RTD, TC, ohm, potentiometer, mA, Vdc and process input signals, allowing the units to be connected to most common sensors. They also feature a detachable LCD display/programming module, providing pushbutton programming without the need for DIP switches or PC tethering. The signal conditioners feature over 100 possible input-to-output combinations and are available in three models.

www.redlion.net

OD optical displacement sensors

SICK has introduced the OD Precision optical displacement sensor. The OD Precision is said to be the only optical displacement sensor on the market to connect three sensors to one controller, which reduces the amount of hardware required and makes it easier to measure the x-, y- and z-axes for improved quality control. The sensors use CMOS technology for detecting targets that are highly reflective or have dark remission characteristics. The sensors require no software, are said to be simple to set up and operate, and can be used in stand-alone mode. A resolution of 0.02 microns makes units suitable for applications that require high levels of accuracy.

www.sickusa.com



Mobile equipment sensing

Pepperl+Fuchs has introduced Mobile Equipment sensors. The IP69K rated inductive proximity sensors are shock test rated to 50 G, can operate from -40° to 85°C, and are said to feature 10x more powerful radiated field immunity than standard sensors. The sensors are available in 12, 18 and 30 mm diameters to deliver 4, 8 and 15 mm sensing ranges, respectively.

www.pepperl-fuchs.com



Gauging verification

The Checker 252 from **Cognex** provides measurement verification through the use of a caliper on an application setup screen. With the familiar look of a traditional Vernier caliper, the Checker caliper automatically locks on the edges of the feature to be measured, sets the minimum and maximum thresholds, and learns edge polarity. Height and width sensors verify the distance between two parallel edges, while the diameter sensor verifies circle diameters.

www.cognex.com

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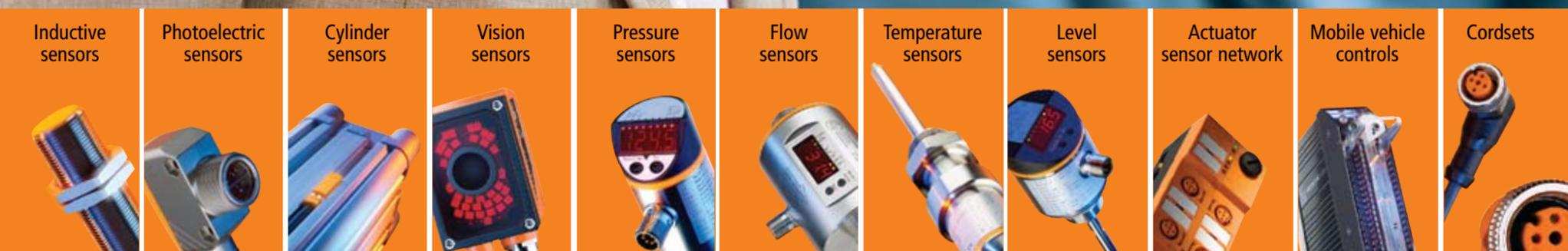


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Cover Story

OptiMate charger revitalizes absorbent glass mat sulfated sealed lead acid batteries

From Front Page

The entire product design and physical prototypes (often using stereolithography or 3D printing) are done in Oakville, while the actual production work (manufacturing) is done in China (high volume) and South Africa (low volume, more complex products).

By utilizing the 3D modeling and view-

ing capabilities in both Pro/E and PTC ProductView, communication between engineering/R&D, sales, marketing, and manufacturing at TecMate International, all located in different parts of the world, has improved significantly, and the quality and accuracy of the final products have also been enhanced.

The TecMate OptiMate 4 product, a weatherproof desulfater-charger with mi-

croprocessor control, refreshes standard, AGM and gel types of SLA batteries. Schilling created features for the OptiMate 4 that included the packaging design and modeling, including all the draft angles for the plastic parts, as well as how the various parts are assembled for the final product. A good example of the new stylish weatherproof enclosure is the OptiMate 4 (predecessor was the OptiMate

3) – the new benchmark for diagnostic battery optimizers for 12 V lead-acid batteries up to 50 Ah.

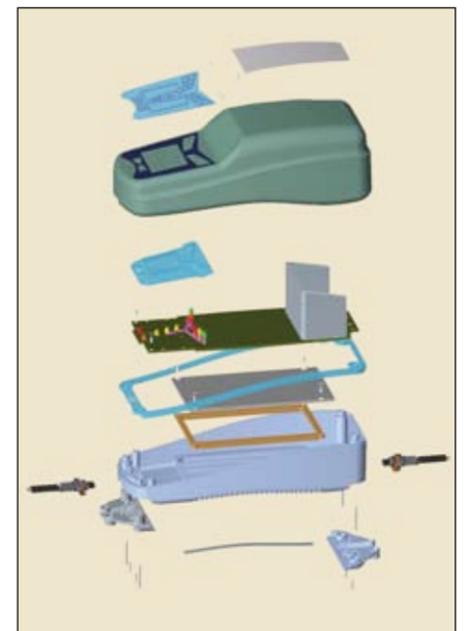
TecMate's Human, a motorcycle enthusiast himself, noted that design cues were taken from a motorcycle's appearance such as the headlights and front/back seat configurations.

"The OptiMate is a battery charger that can recover sulfated batteries, test to confirm successful recovery – a function not many chargers have – and then maintain it safely," said Human.

"There are many maintenance chargers in the market that keep a battery alive over winter, but only if the motorcycle owner remembers to hook the charger up. Ours allows them to recover the battery if they forgot.

"The OptiMate was also designed with new battery technology in mind, such as absorbent glass mat (AGM), whereas our competitors generally have a charging algorithm that 'covers' all batteries, in some cases not adequately – typical of the saying 'Jack of all trades, master of none.'" Human noted that a major motorcycle manufacturer had to replace 40% of its AGM-type batteries before adopting TecMate technology.

The charger product housing has



PTC Pro/ENGINEER solid modeling software allows ORSeS designer Brad Schilling to ensure every component fits into the recharger enclosure, as well as enhance the look of product to end-users.

to have the proper electrical insulating characteristics, according to Schilling. "The enclosure design must be of sufficient thickness to protect the user against high voltage, while providing clearance for the internal electronics package."

He added that ABS is typically used for the body, with clear Lexan for display areas, and custom molded neoprene-like material for cord strain relief. A silicone composite is used as the gasket material for weatherproof charger models, providing a splash-proofing between the two halves of the enclosures' clamshell design.

Another TecMate technology example is the VacuumMate product line, said Human. "It has a co-molded enclosure – soft urethane covering – and it is basically a carburetor/injection throttle body synchronizer.

"We went one step further and added a dynamic test feature that can detect valve problems. It is now the leading synchronizing tool in both motorcycle and outboard marine applications."

ORSeS also provides product design services in a wide range of industries, including agricultural, construction, forestry, mining, structural steel, waste disposal products and electronic packaging.

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Automotive Scene

Tata Nano: India's "people's car" aims at lowest price

By Bill Vance

When Ratan Tata saw families of up to five members riding on scooters he thought there must be a way to give low income people safe, weatherproof, affordable, 4-wheeled transportation. As chairman of India's Tata Group and Tata Motors (www.tatamotors.com), India's largest vehicle manufacturer, including owner of Jaguar Motor Co., he was able to do something about it.

Tata conceived the idea of a car so basic that it could be owned by almost everyone, the same "people's car" philosophy that spawned such cars as the Model T Ford, Volkswagen Beetle, Austin Seven and Citroen 2CV. Out of this desire emerged the Tata Nano (named for its small size) that Mr. Tata aims to sell for the very ambitious price of 100,000 rupees, or \$2,500, the lowest priced production car in the world.

A small team of Tata Motors engineers set to work in 2003 to develop the minimalist Tata car. The group grew to over 500 based in Pune, Maharashtra state, and the new Tata Nano began to take shape.

The Nano was introduced to the public at the New Delhi Auto Expo early in 2008. Since it was planned and designed as a "real" car, not a flimsy, open, unsafe

conveyance with plastic windows and rudimentary body, what emerged was a snub nosed, but not unattractive 4-passenger, 4-door sedan measuring 3795 mm long, 1695 mm wide, 1550 mm high and weighing 600 kg. Trunk space is 15 litres. Savings were realized in such features as a central instrument panel to accommodate left or right hand drive, a single windshield wiper, steel tube seats with integrated headrests, and door handles and mechanisms common to all doors.

The pressed steel body has anti-intrusion door beams, and there are crumple zones engineered in for crash energy dissipation. The 12-inch pressed steel

wheels with tracks of 1325 mm front and 1315 mm rear are set well out to the corners of the car for maximum interior space. Seat belts are fitted, and it will have air bags and ABS for European markets. The Nano is said to meet modern crash standards.

Power comes from a Tata-designed and built 623 cc, aluminum inline overhead camshaft, two cylinder, 2-valve-per-cylinder gasoline engine with Bosch multi-point fuel injection. It develops 33 hp at 5500 rpm and 35 lb ft of torque at 2500 rpm. Bore and stroke are equal at 73.5 mm. The inherent two cylinder vibration is calmed by a balance shaft, and a 4-speed man-

ual transmission takes power to the rear wheels.

Engine cooling air enters through openings at the trailing edges of the rear doors. Electric and diesel versions are planned, as well as possibly one driven by compressed air.

Suspension is fully independent with MacPherson struts in front and coil springs at the rear. Brakes are disk front and drum rear, and steering is by rack-and-pinion.

Performance is slow but adequate, with claimed acceleration from zero to 70 km/h of 14 s and top speed of 110 km/h (comparable to early Volkswagens). Fuel consumption is quoted as 4.5 to 5.0 L/100 km, and it is claimed to meet modern European emission standards.

The Nano is planned as a standard \$2,500 version and a more expensive deluxe model with such amenities as air conditioning, improved seat coverings, central locking and power windows.

Tata is also reportedly planning to produce the Nano in kit form that could be shipped anywhere for assembly by Tata trained workers using Tata tools. Tata intends to begin at a production rate of 250,000 annually, eventually rising to possibly 1 million. The Nano launch is planned for early in 2009.

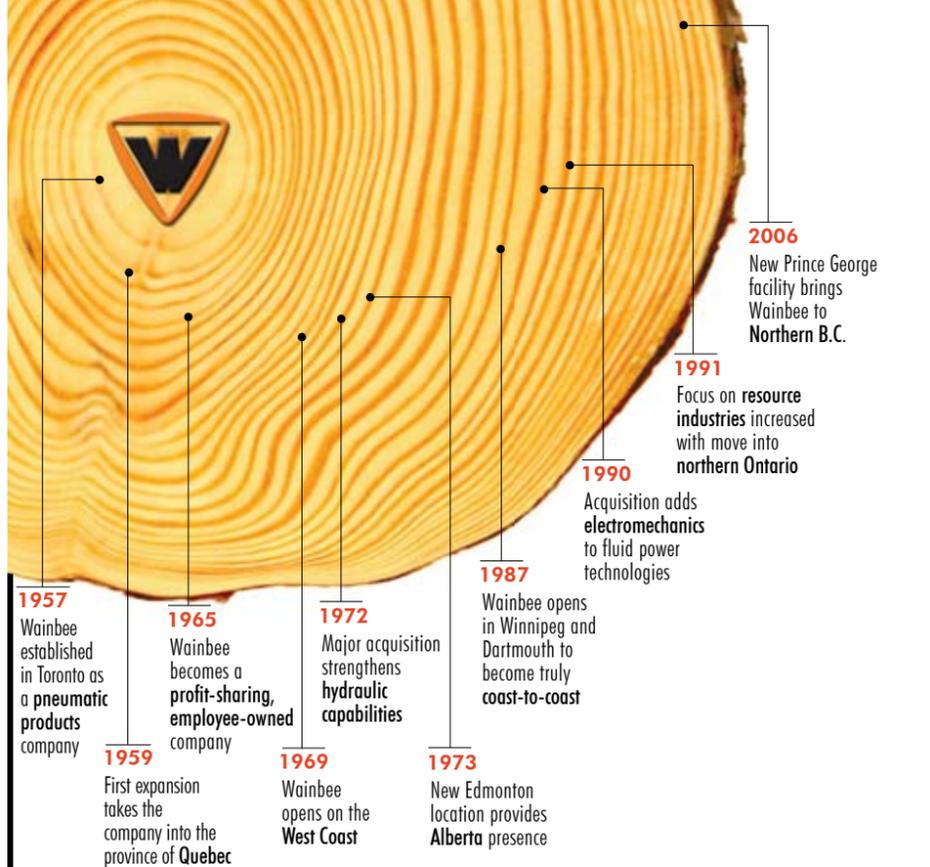
Bill Vance is an automotive journalist and author.

www.billvanceautohistory.ca



The Tata Nano launch is planned for early this year with initial production levels of close to 250,000 units.

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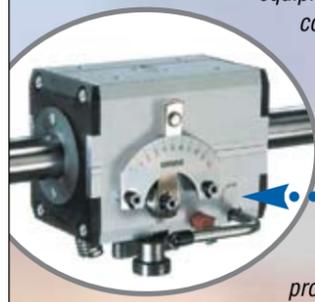
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Feature: Motion Control

Walking-beam conveyors allow multiple processes

By Murali Shivamuthulingam

Almac Industrial Systems, the Ontario-based manufacturer of material handling equipment, has added a 'Walking Beam' to its portfolio.

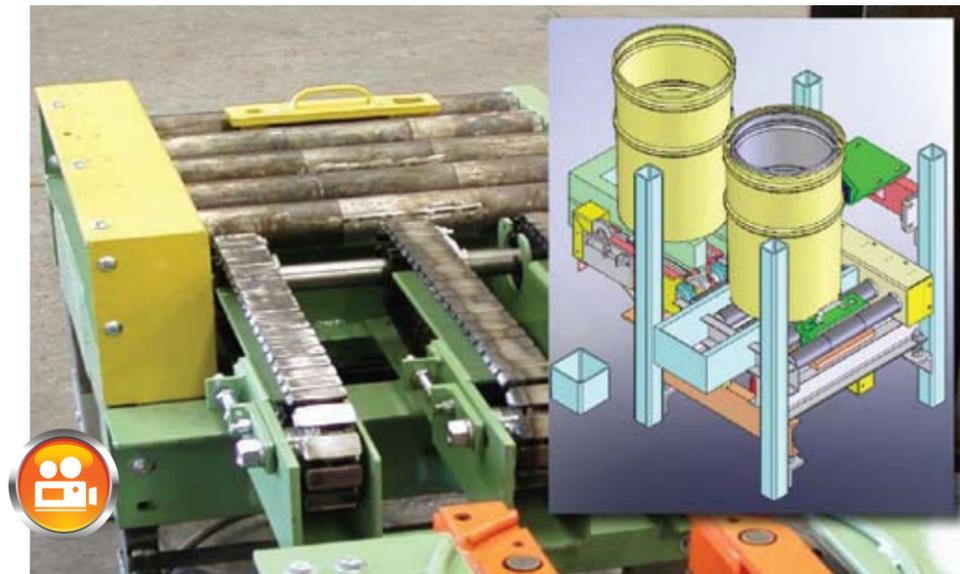
Offered as an automated transfer and storage bank with mechanically actuated transfer unit, the Walking Beam is packed with unique features, including the exoskeleton frame, "walking beam" suspension, and a drive train and track system.

When engineers think about synchronous automated assembly systems, they

most often picture rotary indexing dials or carousels. But, there is another synchronous automation platform that should not be overlooked: the walking beam.

A walking beam moves product sequentially in straight-line steps. To advance the product, the beam usually engages them from below, moving up, forward, down and back. In some cases, the beam contacts the products from the side. The equipment is also fitted with facilities for vibration at fill points for compacting.

For speed and accuracy, the motion



Specially designed conveyor using both rollers and chain transfer at the exit section of the walking beam is shown.

of the beam is most often generated by a rotating camshaft powered by an electric motor or a roller movement in a profile powered by hydraulic cylinder, explained Robert Austin, senior designer at Almac Industrial Systems in Aurora, ON. The beam's motion replicates an arm that rises and falls like a seesaw.

These machines are based on high performance servo technology and provide a stable and fast transfer system for rigid containers where alternative in-line transfer systems such as rope or chain conveyors are unsuitable. Filling options include high accuracy program forward weight controlled filling, with facilities for vibration at fill points to compact difficult products.

The weighing is accomplished by load cells mounted on a fixed structure within the path of the movable carriage of the walking beam conveyor or the load cells are built into the carriage itself.

A walking-beam conveyor for the stepped conveyance of drums or similar conveyed stock typically has at least one walking beam that is raised and lowered by lifters between lateral support rails and is movable by at least one longitudinally effective actuator in the longitudinal transport direction. Almac products use Allen Bradley MicroLogix 1000 compact processor with fixed I/O for controls but can also be customized to incorporate other type of control systems.

Preferably, such a walking-beam conveyor has a plurality of walking beams arranged successively in the workpiece-travel direction that are moved step-wise downstream and upstream jointly. At the same time, the walking beams are jointly raised while moving downstream and lowered while moving back such that the drums or the like resting on the lateral support rails can be conveyed in steps in the workpiece-travel direction.

Murali Shivamuthulingam is a senior design engineer for Almac Industrial Systems.
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Automating a pipette system for a lab automation company

Feature: Mechanical CAD

Software licensing system adds flexibility, economy

HyperWorks multiphysics platform ensures design accuracy, fewer physical prototypes

By Mike Edwards

TORONTO – HyperWorks, the multiphysics software environment from Altair Engineering Inc. (Troy, MI), provides a unique licensing system for design engineering groups to add both flexibility and economy to the way they deploy their CAE applications.

Program applications in HyperWorks scale up from tools for modeling and visualization to motion analysis and structural analysis and optimization. According to Altair Canada technical applications manager David Kirby, traditional licensing systems use a “stacking” method, that is, tokens are needed for every used copy of a software product. Fees often apply if a customer wants to use additional products, Kirby explained.

In the HyperWorks licensing method, the product with the highest value determines the number of GridWorks units (GWUs) in use. Effectively, this allows a single user to access multiple products simultaneously at no additional product access fee, Kirby added. “The system is unique to Altair Engineering and our customers really appreciate the flexibility and economic value it brings to them.”

Because of the compute-intense nature of Altair analysis and solver applications, the company also offers PBS PRO, a distributed computing program for managing compute intensive jobs running on a linux cluster, desktop or other high performance compute resource. PBS PRO enables any compute applications and Altair applications such as RADIOSS, an implicit/explicit finite elements analysis solver, to execute solutions in a timely fashion.

According to Altair Canada president Jean-Pierre Roux, “PBS PRO middleware is used to schedule runs and dispatch routines to multiple cores.”

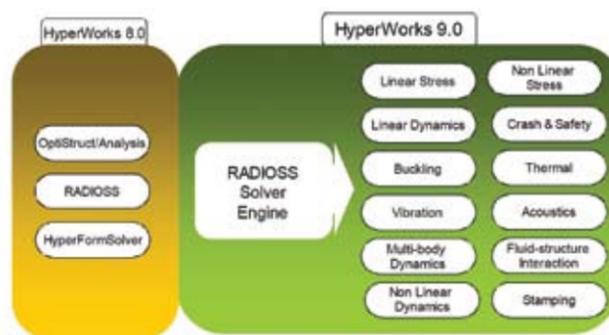
“Another benefit, under the HyperWorks Partner Program launched in April 2008 (www.hyperworkscommunity.com), is that third party applications can be accessed by users using their GWUs.” These applications cover durability, CFD, electromagnetic interference and analytics and Business Intelligence (BI), with more vendors coming, said Roux.

Roux explained that HyperWorks requires no additional plug-ins to import/export data from 3D file formats from CAD since readers are included at no additional charge. In addition, neutral formats such as IGES and STEP are also included. After import, Models are de-featured, meshed, and setup in HyperWorks, then submitted to the appropriate Altair solver or other third party FE solvers for solution.

“Engineers want more detailed information from simulation, which pushes the fidelity and complexity of models to ever greater levels” said Kirby. “Altair HyperWorks is very good at handling these kinds of models all within an extremely flexible and easy to use interface.”

Following the model cleanup, or meshing, the RADIOSS solver engine in HyperWorks 9.0 can perform a broad range of multiphysics tasks (see chart above). Roux noted that sectors such as rail, aerospace, electronic goods, power generation and medical products can benefit from the capabilities inside RADIOSS.

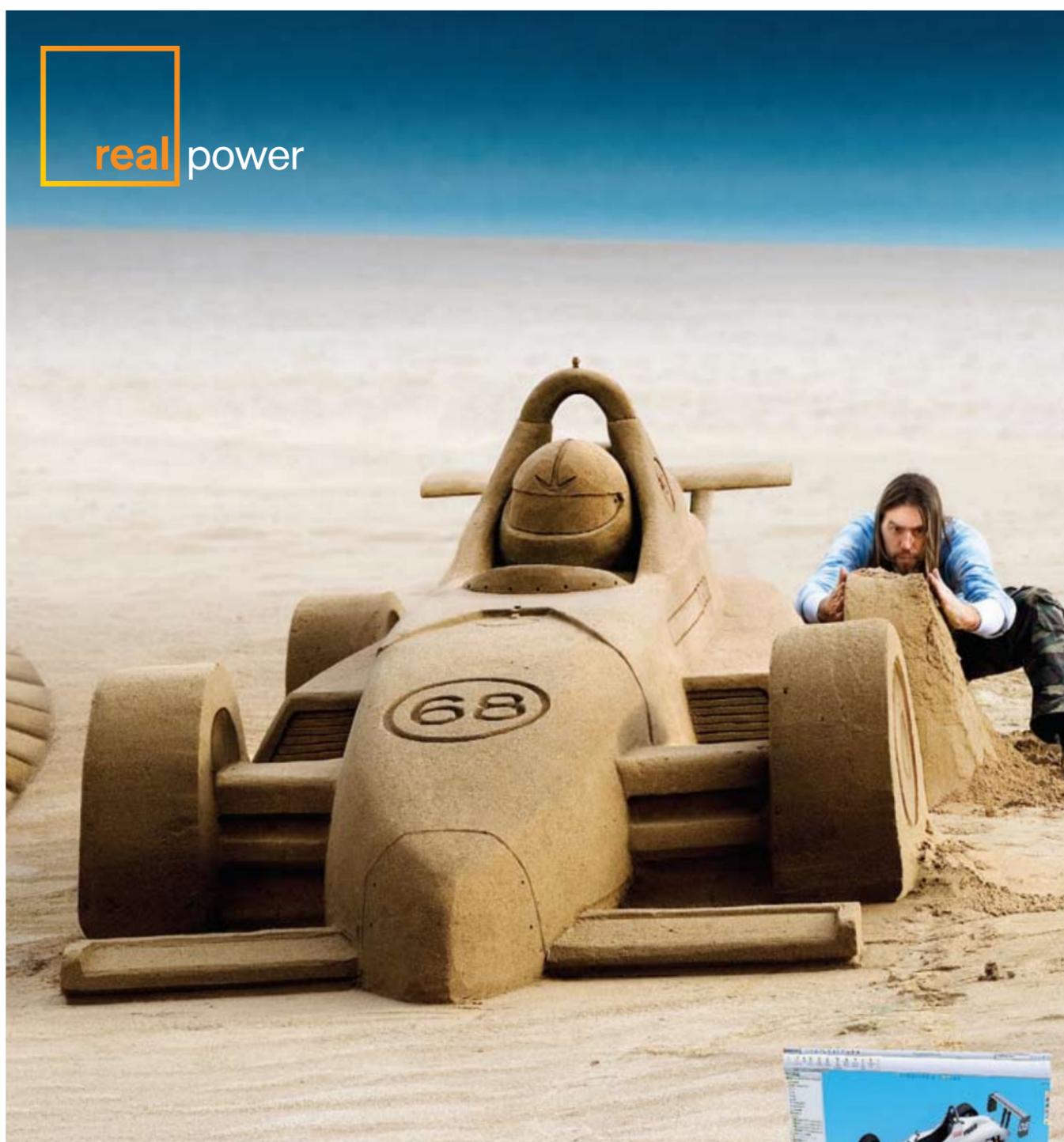
By following a workflow in



The RADIOSS solver engine in HyperWorks 9.0 can perform a broad range of multiphysics tasks, including linear and non-linear stress, linear dynamics, crash and safety, buckling, thermal, vibration, acoustics, multi-body dynamics, fluid structure interaction, non-linear dynamics and stamping.

HyperWorks, design engineers can establish “better accuracy and more capabilities that simulate the real world,” said Roux. “The trend...is towards less

physical testing and more robust simulation – you don’t have to build as many prototypes.” For training, go to: www.altairengineering.ca



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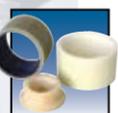
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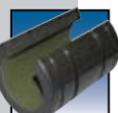
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Products: Mechanical CAD

Autodesk provides 3D CAD software progression for Bosch Rexroth Canada

By Mike Edwards

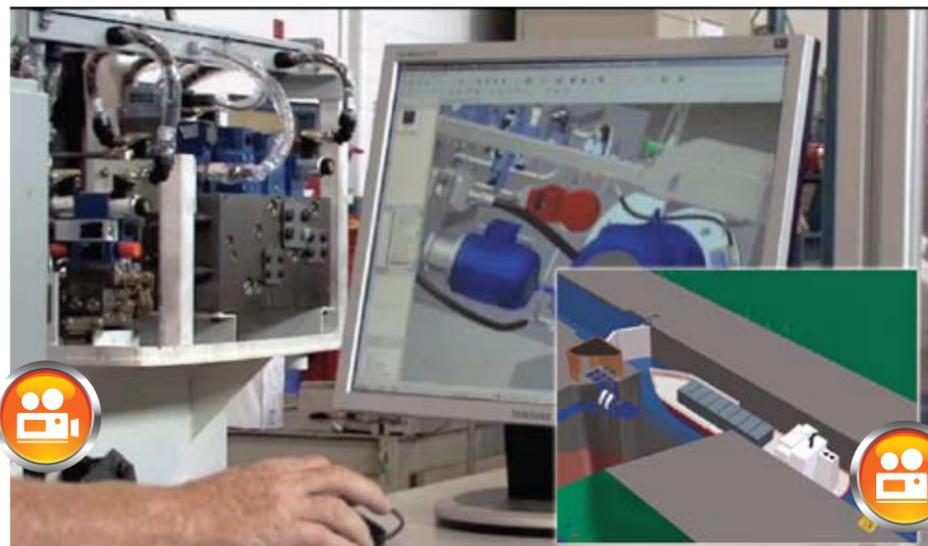
Bosch Rexroth Canada, which provides motion and control solutions for many sectors, including industrial hydraulics, linear controls, servo drives and mobile hydraulics, has had many successes over the years, including the ongoing Welland Canal modernization project that commenced in 2002 and is due to be completed this year.

Driving the design technologies at Bosch Rexroth Canada (boschrexroth.ca) is Hydraulic Business Unit design manager Jim Lambert, who is responsible for staying current with CAD tools that drive his business. According to Lambert, the company committed to software tools from Autodesk Canada – for a variety of reasons – as far back as 1999.

Initially, Bosch Rexroth began with AutoCAD 2000, a 2D modeling package from Autodesk. By 2003 the company was ready for 3D and chose Autodesk Inventor (www.autodesk.com/inventor), in part because local technical colleges had students who had already trained on the platform, and also because of strong support from its local Autodesk value-added reseller. Lambert said he'd considered the more mature SolidWorks product at that time for 3D solid modeling, but had concerns with the intentions of its parent company, Dassault Systèmes. But while Dassault has stuck by its SolidWorks platform development, Lambert hasn't regretted sticking with Inventor.

"Autodesk addressed Inventor's shortcomings over the next two years," Lambert said, "and Inventor looked at the complete manufacturing process."

Another attraction for Inventor was Vault, the program's file management system that is running on SQL server. "Vault came along when our file storage was growing at an exponential rate, and we certainly didn't want to overwrite files."



The Inventor 3D solid modeler has helped Bosch Rexroth Canada (video left) to improve designs, increase productivity and transition from 2D. The Welland Canal project (inset, video) illustrates the power of 3D.

Bosch Rexroth is currently migrating to the SAP enterprise resource planning (ERP) platform.

When Lambert wanted to create a portal for all manufacturing team members to view data, Bosch Rexroth implemented Autodesk Productstream. Productstream software is designed to securely store and manage engineering design data and related documents, and serves as the pipeline between different workgroups in the digital prototyping workflow.

According to Kerry Saumur, Autodesk sales development director – Americas, Manufacturing Solutions Division, "Productstream has the capability of communicating with a variety of ERP systems such as Exact, SAP, Ban and Microsoft suites.

"It streamlines data management – you don't have to re-input information such as BOM data, so you reduce your time to market and maintain data accuracy."

Saumur said that having Inventor allows users to maintain 2D to 3D data

bidirectionality, such as with AutoCAD Electrical and AutoCAD Mechanical. He added that having 3D digital prototyping capability "reduces the number of physical prototypes," a benefit that is invaluable to Lambert and Bosch Rexroth, considering the scale of its hydraulics projects. Lambert estimates that using Inventor has cut his product development cycles by 50%.

Never one to stand pat, Lambert is always looking at ways to improve collaboration between design project stakeholders. At Autodesk Labs (<http://labs.autodesk.com/>), he pointed out Project Freewheel, an online application that allows users to view and collaborate with design data without installing additional software – only a browser is required. Project Freewheel is both a website where users can type in a URL to their own design data for interactive viewing, and a web service that allows users to embed an interactive viewer of their own design data in their own HTML pages.

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Brayton Energy develops innovative applications for gas turbines

The race to develop innovative, renewable and environmentally responsible methods of energy to fuel the needs of a modern society is heating up, and one Canadian company is taking gas turbine technology into completely new directions.

Brayton Energy Canada of Gatineau, QC (braytonenergy.net), is using integrated SolidWorks 3D design software to develop several innovative energy applications that combine abundant, renewable fuels with a gas turbine – the technology used to power jet aircraft engines – to create new hybrid engines, portable generators, and complete power plants. While gas turbines have long been the engine of choice for aviation, the technology behind jet engines also holds great promise for uses ranging from the conversion of biomass (e.g., construction waste and wood) into electricity to the application of natural-gas-powered hybrid fuel cell/turbine engines for driving large vehicles.

Advancing the promise of gas turbine technology

Founded in 2004 to advance the development of environmentally responsible energy technologies, Brayton Energy is developing new gas turbine technologies in a variety of areas, including a unique hybrid solid oxide fuel cell (SOFC) system that operates in combination with an innovative high-efficiency intercooled recuperated (ICR) gas turbine system for vehicular applications. “The ICR gas turbine design provides exceptional performance, is lightweight, and is economical,” explained Antoine Corbeil, president of Brayton Energy Canada. “The system reduces emissions substan-

tially, especially when used with natural gas, and takes advantage of a variable area nozzle to improve part-load efficiency. All of our systems utilize our innovative recuperator to improve gas-turbine cycle efficiency, creating a viable alternative for powering hybrid-electric buses and long-haul trucks.”

Working with its sister company, Brayton Energy LLC, in the U.S., Brayton Energy Canada is drawing upon its expertise in gas turbine and heat exchanger development for the hybrid fuel cell/gas turbine engine project. The sister company is developing a utility-scale solar turbine in Arizona, which uses a parabolic mirror and the sun’s rays to create the external heat source that is required to drive the gas turbine.

“The two companies work closely and share technology back and forth,” Corbeil points out. “Whether the turbine uses the warmth of the sun, natural gas combustion, or heat generated from a fuel cell to raise the temperature of the compressed gas, our key innovation is to use recuperator/intercooler configurations to improve the efficiency of the gas-turbine cycle and generate electricity.”

Brayton Energy has accelerated the pace of its development efforts on the



Brayton Energy Canada developed this complete ICR gas-turbine hybrid engine for use in a truck envelope using integrated SolidWorks 3D design software. Click for video of engine functions.

hybrid fuel cell/gas turbine engine project by using the fully integrated SolidWorks development platform (solidworks.com). The company creates its initial designs, which can involve assemblies of as many as 50,000 parts, using SolidWorks 3D CAD software; conducts structural, thermal, and fluid flow analysis using integrated SolidWorks Simulation and SolidWorks Flow Simulation software; and documents the entire process using integrated 3DVIA Composer product documentation software (3dvia.com).

Corbeil noted, “It’s fantastic to be able to model a design concept and conduct a structural or flow analysis without have to jump through several different pieces of software. With SolidWorks, we remain in our base modeling package as we modify and refine our design. With 3DVIA Composer software, we can document our products in a professional manner directly from the final CAD model.”

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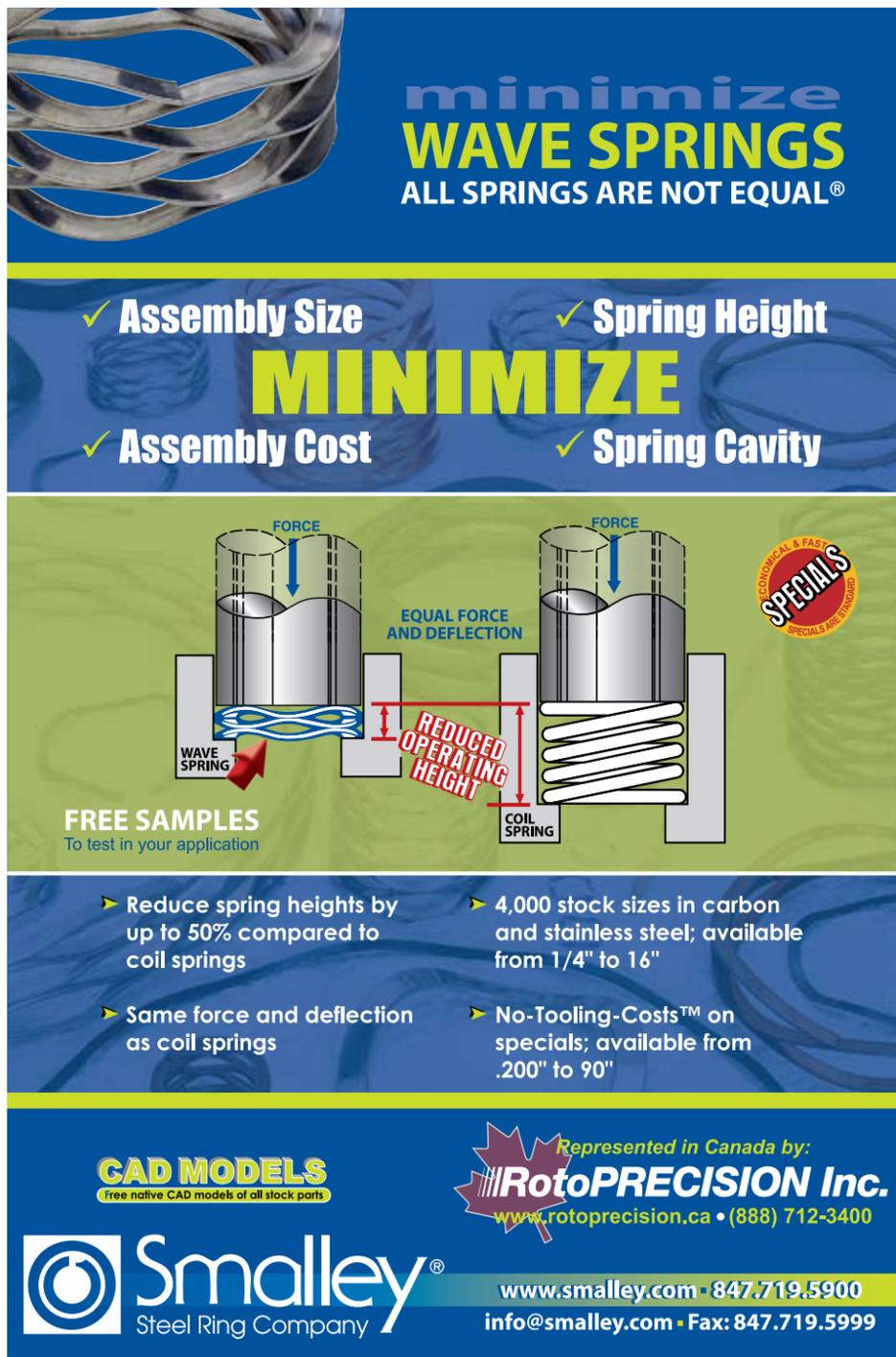


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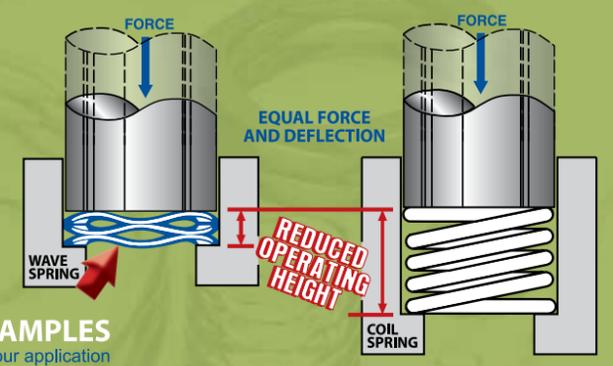


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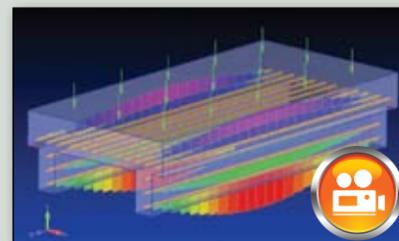
Microsoft, SolidWorks enhance robot simulation

Microsoft and DS SolidWorks have announced a simulation capability to help program robots more quickly and effectively. Users of Microsoft Robotics Developer Studio 2008 are said to now be able directly incorporate 3D CAD models designed in SolidWorks software into Microsoft's Visual Simulation Environment (Microsoft VSE) and simulate their operation more accurately. Both applications support a common XML format, COLLADA, for rendering 3D.

www.microsoft.com/robotics



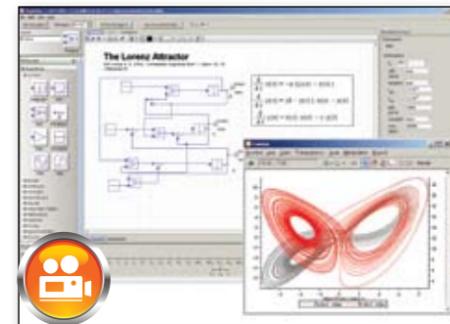
Interactive meshing tools for faster FEA



Siemens PLM Software has announced Femap Version 10, a PC-based CAE modeling solution. The release is said to allow users to see how a part interacts with everything around it, for example, by letting a designer represent surrounding geometry as a surface mesh and combine that with a solid mesh of the individual part. Pre- and post-processing benefits to CAE analysis includes remeshing and mesh quality functionality that is now centralized within the user interface. Femap is also integrated with NX Nastran and both support 64-bit Windows.

www.siemens.com/plm/femap

Modeling, simulation reduces project cost, time



MapleSim, the multi-domain modeling and simulation tool from Maplesoft, has physical modeling techniques to reduce the time and cost spent creating models. Users can create the system diagram on the screen, in the same way they would draw it on paper. The model equations are then generated automatically. MapleSim applies symbolic preprocessing techniques to these model equations, creating simplified models. Code generated from these simplified models can be exported to real-time and other applications. See review on page 20.

www.maplesoft.com/products/maplesim/index.aspx

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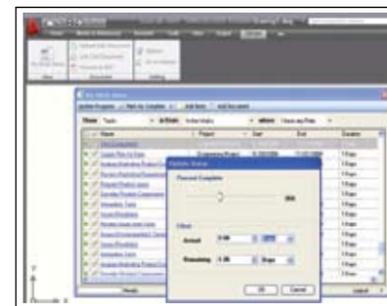
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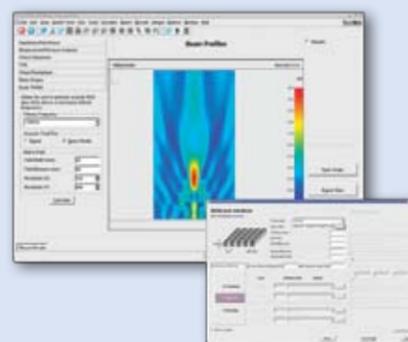
AutoCAD Project management

Clarizen, a provider of on-demand, on-line project management software, has announced its integration with Autodesk's AutoCAD software. The partnership lets engineers and developers using AutoCAD software work directly with Clarizen's SaaS project management application to update and manage their projects directly without leaving their AutoCAD system. In addition, information is accessible to managers, clients and other distributed teams via Clarizen's online project management application.

www.clarizen.com



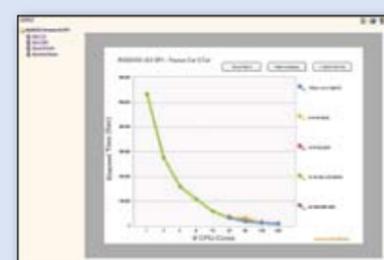
3D virtual prototyping software



Weidlinger Associates has announced PZFlex 2.1 3D virtual-prototyping software. PZFlex includes: 2D and 3D solvers; time domain simulation; isotropic and anisotropic solids and fluids (linear and non-linear); piezoelectric, electrostrictive (3D), and magnetostrictive (2D) materials; and, thermal and thermal-mechanical solvers.

www.pzflex.com

Benchmark website for finite element solver



Altair Engineering has announced a website that allows Altair hardware partners and RADIOSS finite element solver hub users to download and run four separate typical RADIOSS models, and then post the results on the website, making them available for customers to view. The benchmark program includes demonstrating the scalability and repeatability of RADIOSS on a variety of HPC platforms.

www.altair.com/benchmarks

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Technical Literature

Modeling. ISA has published *Models Unleashed: Virtual Plant and Model Predictive Control Applications* to provide a presentation of the concepts, procedures, and examples needed to construct and apply both types of models using "state-of-the-art" software for simulation and model predictive control.
www.isa.org/modelsunleashed

Springs. The *Lee Spring 2009 Stock and Custom Catalog* features over 16,000 inventoried products including three product line expansions – REDUX wave springs, light pressure compression springs and battery springs.
www.leespring.com

Bearings. igus has published a 2009 catalog for its bearing products, including iglide plain bearings, igubal spherical bearings and DryLin linear guides and slide tables.
www.igus.com/email.asp

Hydraulic safety. Lynch Fluid Controls Inc. has announced what it says is the first-ever hydraulic safety DVD about potentially debilitating oil injection injuries. *The Lethal Strike* focuses on the correct pre-hospitalization management of an injection injury. A fee applies. View the video trailer at:
www.lynch.ca/LethalStrike

Boiler safety. The Clark-Reliance Corp. has announced the availability of a free *Boiler Safety Checklist*. The laminated checklist can be displayed near boilers to act as a source for ensuring compliance with Section 1 of The American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code.
www.clark-reliance.com

Encoders. SICK Stegmann has published a *Guide to Encoder Solutions*. The guide provides a technical overview of incremental and absolute encoder technology and details their range of incremental encoders, absolute encoders, linear encoders and wire draw systems, Hiperface adapters and accessories.
www.stegmann.com

Motor sizing software. Copperhill Media has announced an upgrade to its *VisualSizer* motor sizing software that addresses users running Windows Vista.
www.visualsizer.com

Polymers. A technical brochure from Victrex highlights the key features of T-Series polymers, proprietary blended products based on Victrex PEEK polymer and Celazole polybenzimidazole (PBI). Charts and graphs compare wear and strength properties up to 300°C.
www.victrex.com

Bearings. Kaydon Corp. Bearings Division has released an expanded edition of its slewing ring/turntable bearings catalog, with over 100 more pages of new bearing sizes.
www.kaydonbearings.com

CAD Industry Watch

MapleSim makes modeling, analysis easy

By Bill Fane

Theory and practice are the same in theory, but seldom in practice. Theoretically, virtually any aspect of our physical world can be modeled and analyzed mathematically.

In practice, it can rapidly become very difficult to perform all of the mathematical manipulations required to complete the analysis, assuming we can even set up the mathematical equations to begin with. The study of transient responses is a typical example. The basic formulas for a linear spring-mass-damper system are relatively simple, but the mathematical model of a complex multi-element non-linear system rapidly gets out of hand.

Model a compound spring-mass-damper system

Maple 12 software from Maplesoft is a well-known mathematical processing engine that helps in this regard. With it, you can enter complex equations, preferably starting from the many fill-in-the-blank ones that ship with it, enter your parameters, and away it goes.

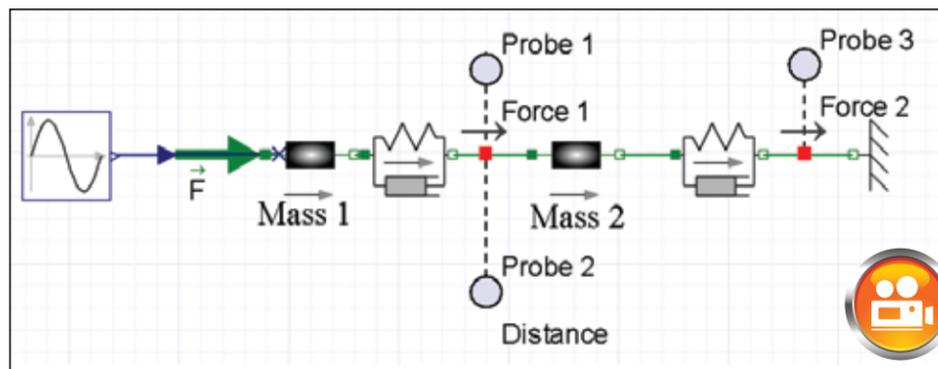
Now we come to the theory versus practice part again. Although Maple can easily solve the equations, it can be very difficult to know which equations are involved.

Maplesoft have introduced a new product called MapleSim 1.0 that works hand-in-hand with Maple 12 to solve this problem. With it, you simply model your system in a schematic form using basic drag-and-drop components. You then apply the appropriate parameter values to the model such as the masses, the spring rates, and the damping coefficients. MapleSim 1.0 then constructs the appropriate equation or equations and then passes them over to Maple 12 to be solved.

Now here's the cunning part, or more properly several cunning parts.

First, MapleSim 1.0 ships with over 300 pre-defined components. These cover the five major categories of Signal, Electrical, Mechanical, Multi-body and Thermal. Within each category, components include signal blocks, routers, analog and digital devices, bearings, gears, clutches, brakes, springs, dampers, resistors, capacitors, inductors, thermal conductors, temperature sensors, and so on as appropriate to each category.

Now it gets really cunning. You can mix and match elements so that the model of an



Schematics can easily be built with MapleSim 1.0 using drag-and-drop components. Users can then apply the appropriate parameter values to the model such as the masses, the spring rates and the damping coefficients.

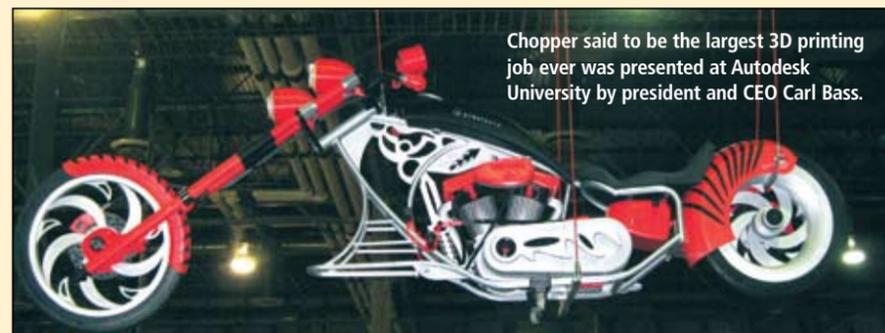
electro-mechanical actuator can include the mass and friction of the mechanical components along with the resistance, capacitance, and inductance of the electrical components. When you feed it a stepped voltage input, MapleSim 1.0 can graph the transient force, speed, and accelerations at various points within the mechanism.

A collection of elements can be turned

into a named subsystem. A sub-system can be used over and over again, with the same or different parameters. You can attach a custom graphic image to a sub-system so that the symbol for a motor/clutch/brake unit looks like the actual unit.

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

Autodesk University 2008: What Happens In Las Vegas...



Chopper said to be the largest 3D printing job ever was presented at Autodesk University by president and CEO Carl Bass.

...sometimes leaks out of Las Vegas. Autodesk held its annual educational event, Autodesk University 2008, in the Venetian resort/hotel/casino in the heart of the Las Vegas strip. Yes, I know it can be hard to convince the boss that a trip to Las Vegas is a legitimate business trip, but just look at the numbers and the sheer magnitude of it.

By the time you added up the 10,000 or so attendees, plus instructors, staff, tech support people and exhibitors, you end up with close to 13,000 people.

The classes run the full gamut from the relatively beginning to the sublimely expert on virtually every one of Autodesk's 140 or so products, including AutoCAD, Inventor and Revit.

One of the speakers at the main keynote session was Carl Bass, president and CEO of Autodesk, who talked about "digital prototyping." These are

Autodesk's buzz words to describe the process of analyzing a potential design as 3D computer models in order to reduce or eliminate the need for physical prototypes. The big projection screens showed an Inventor model of a "chopper" style motorcycle. He then asked "If we can show the physical world in the digital world, why can't we bring the digital world into the real one?" A full-size model of the chopper standing on stage was then revealed. Bass stated that it is the biggest model ever produced by 3D printing.

I also attended the Manufacturing keynote, where the feature speaker was the famous (or infamous) Burt Rutan, known for his radically-different air/space craft designs. He stated that computers and their software are great for doing the detailing and the analyses, but the ideas still have to come from humans.



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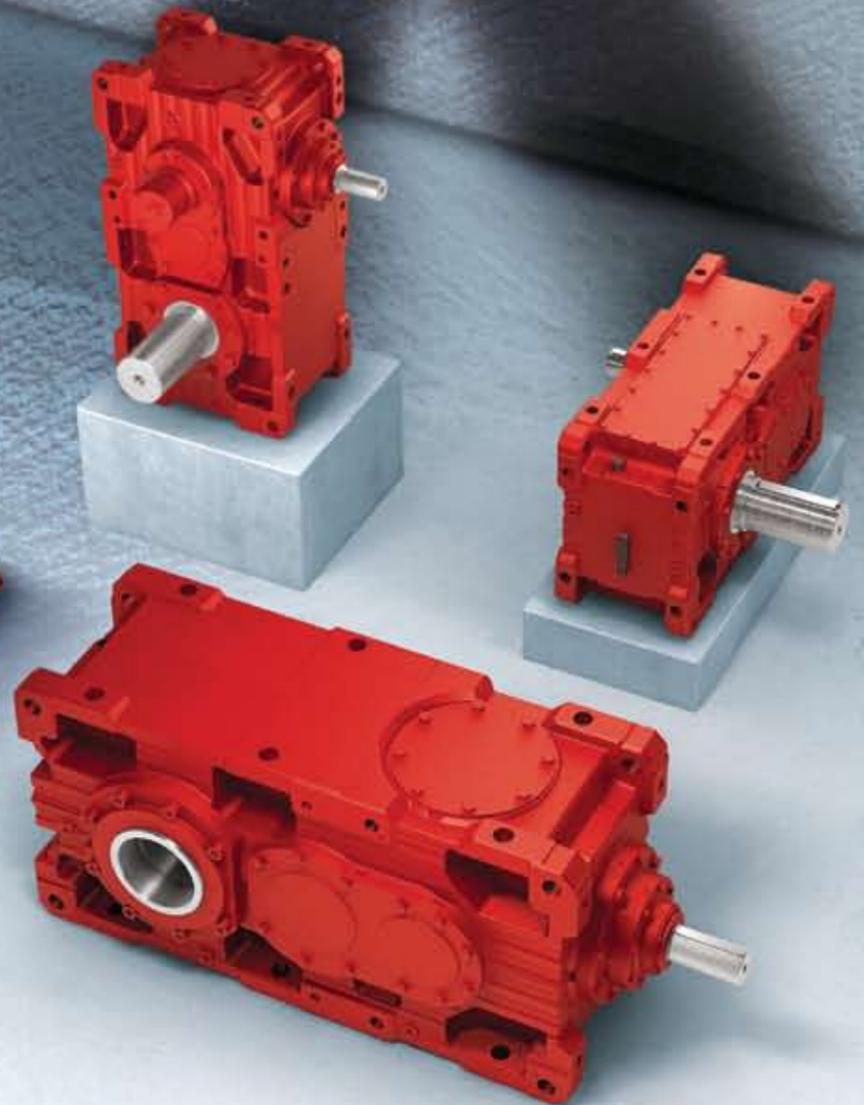
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Feature: Hydraulics & Pneumatics

Festo conference trumpets energy efficiency as sound economics

By Mike Edwards

DELFT, THE NETHERLANDS – Finding cost savings in manufacturing operations, a priority in the best of times, was the theme of the 7th International Festo Press Conference here last month. The theme, “Mission: Efficiency – Pathfinder for Systematic Savings” certainly speaks to the economic uncertainty enveloping the globe.

“Innovation is even more important in times like these,” Dr. Eberhard Veit, chairman of Germany-based Festo AG (www.festo.com), told the conference. “Mechatronics, miniaturization, piezo

technology and systems technology are catchwords which aren’t just pointing the way towards more efficiency in emerging business areas like photovoltaic.

“The efficiency of a production system can be significantly increased by using an optimum mix of pneumatics, servo-pneumatics and electrical components.”

In his wide-ranging address, Dr. Veit outlined Festo’s nine-step vision for bring efficiency to its customers, including improved customer service, creating value for the customer and becoming the customer’s number one partner. Being a global company, Festo can be close to its customers, both as a partner providing design innovations and in ongoing service, he explained.



“In a downturn, you have to show that your services are worthwhile.” Efficiency incorporates adaptive pro-

The 7 m long combination filler from Visser for tree nurseries for planting trees in pots as well as trays (above). The filler, which relies on automation components from Festo, can fill 650 trays per hour, and with 20 slots per tray that amounts to 13,000 pots per hour. Click for video demonstration at a Visser customer.

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duction, according to the Festo vision. “Plug and work” process modules for self-adaptive systems save customers time in the ramp-up to production. Festo is using a European integrated research project for an adaptive production platform pilot.

But Festo technology for efficiency exists to reduce energy consumption right now. For example, the servo-pneumatic gripper HGPPI from Festo is said to offer an advantage in comparison with electrical grippers. The use of innovative piezo technology reduces installation space and energy consumption, because energy is only required during switching motion. Piezo-ceramic bender actuators with proportional switching performance ensure minimal energy consumption and short cycle times.

New functions are also being made possible by means of Festo microsystems technology with bus compatible sensors and micro-components – part of its mechatronic systems strategy. Decentralized intelligence, flexibility and increased precision as well as continuously increasing degrees of miniaturization and production, with reduced consumption of resources, are the most important innovation drivers for microsystems technology in the field of machinery manufacturing.

Wherever manufactured parts are becoming smaller and smaller and where minute structures can only be recognized with the help of a microscope, pneumatic automation technology is also moving into the micro-ranges at Festo. Extremely small miniature valves, mini-slides, micro-grippers and service units are already available today and have become firmly established in the areas of light assembly and electronic components manufacturing. For example, the Festo miniature valve MH1 is said to demonstrate 3x the volumetric performance of conventional valves of similar design.

In terms of energy efficiency, valuable compressed air can be saved by continuously hunting down leaks and observing air consumption trends over long periods of time in comparison with a reference value. Festo’s energy monitoring system GFDM includes a complete package of products and services for condition monitoring. It enables air consumption to be monitored and analyzed, and automatically collects reference data in combination with limit values and trends.

Products: Hydraulics & Pneumatics

Gear pump for mobile apps



Eaton Corp. has introduced Group 2 A-Cast Iron series pumps to its Global Gear Pump (GGP) line. The pumps are available in 10 displacements from 8.0 to 36.0 cm³/rev with maximum operating pressure up to 310 bar and speed up to 3600 rpm.

www.hydraulics.eaton.com

Pneumatics interface



Bosch Rexroth has introduced an IO-Link interface for pneumatics that is said to offer simpler commissioning and maintenance, as well as extended diagnostic options. Sensors, valve terminal systems and pneumatic pressure regulator valves that support the new, open communication standard are available. With the standard, the Rexroth components transfer process and diagnostic data is also said to increase the intelligence of the lowest field level. Communication between the IO-Link and common field buses is also possible. Parameterization and inquiry of diagnostic and status data of the intelligent sensors and actuators takes place centrally via the controller or other HMI units.

www.boschrexroth.ca

Rod/shaft power-off clamping



The AMLOK hydraulic series RCH rod clamp from Advanced Machine & Engineering has been developed to provide power-off clamping of rods and shafts. The rod clamps are actuated by a spring/collet mechanism and unclamped by hydraulic pressure. The rod clamps are designed to clamp components after the motion has stopped and to hold the position securely as long as the forces do not exceed the table values. The mountings have been designed to apply to standard heavy duty NFPA-style MF1 cylinders. Since the locking of the rod clamp is accomplished mechanically and unlocked by hydraulic pressure, loss of hydraulic pressure to the rod clamp will cause the unit to lock. The holding force depends upon the rod diameter and the amount of hydraulic pressure (psi) available for unclamping.

www.ame.com

Moisture-in-oil detection



Vaisala has extended its moisture-in-oil product range with the Vaisala HUMICAP Moisture and Temperature Transmitter for Oil MMT162. The transmitter offers continuous measurement of moisture in oil and incorporates the latest generation of the Vaisala HUMICAP Sensor. Transmitter features include: two analog outputs, an RS-485 serial output and an optional LED-cable that enables a visual alarm.

www.vaisala.com

Directional control valves



Nachi America has introduced SK-G01 series wet type solenoid operated directional control valves suitable for outdoor hydraulic equipment applications. Features include dust and water resistance to JIS C 0920/IP67, as well as vibration proof performance to JIS D 1601 3 D Grade 90 Division 400. Maximum flow rates range from 50.0 to 100.0 L/min for standard types and from 40.0 to 50.0 L/min for shockless types. Maximum working pressure is 35 MPa for standard types and 25 MPa for shockless types.

www.nachihydraulics.com

Non-marking vacuum cups



Anver Corp. has announced Clean Vacuum Cups molded from proprietary blended polyurethane that is offered in 60 Durometer clear and 50 Durometer orange versions. Non-marking and wear-resistant, the suction cups are suitable for packaging and product handling equipment where rubber or silicone is not desirable. The vacuum cups available in 3 to 6 in. O.D. sizes, and are offered in a flat style with cleats on the bottom and in single bellows style.

www.anver.com

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Editor's Choice

Wireless Ethernet



The Factory Line FL Bluetooth AP module from Phoenix Contact enables the wireless integration of Ethernet-capable automation components into an Ethernet network. Both IP and Layer 2 Ethernet protocols such as Profinet can be transferred because the data forwarding is performed transparently. The Bluetooth standard, which allows stable and reliable communications even under adverse industrial conditions, serves as the wireless technology. Numerous wireless connections can be switched in parallel locally. The special coexistence functions also allow IEEE 802.11 b/g WLAN systems to be installed concurrently. Three different operating modes are supported: the component can be employed as an access point for up to seven participants, as an Ethernet client adapter, or as a serial Bluetooth COM server.

www.phoenixcontact.ca

Power distribution



Rittal Systems has announced SV series power distribution busbar systems for needs ranging from 250 to 3000 A. For systems with motor contactors, motor circuit breaker and miniature circuit

breaker, SV busbar systems are said to increase free internal enclosure space, reduce assembly time by 40% and increase design flexibility. SV systems are available with either flat copper busbar, or Rittal profile busbar already cut to length to suit the enclosure.

www.rittal.ca

Relays extend display



The fifth-generation of SmartRelays from IDEC include the model FL1E. The unit has an external message display panel, hardware improvements and upgraded software. The 4 x 12 backlit LCD is said to make it easy to view input, output, analog values, or even timers and counters. Users can display the same message text as the FL1E or select different information to be displayed. Troubleshooting failures or making quick adjustments as needed without opening the panel are possible. The message display is bar graph capable and a scrolling feature allows up to 24 character messages to be shown on the screen. This external display is also IP65 and NEMA 4/4X rated.

www.idec.com/smartrelay

Analog signal processing



Weidmuller has introduced the MANN series of products for processing analog signals. The series ranges from simple dedicated units to complex micropro-

cessor-controlled devices that include signal isolators and transmitters, process alarms, multi-channel processing modules, indicators and configurable displays, counters/totalizers and calibration devices. The products also offer a variety of integrated functions including timing delays, adjustable threshold values and a programmable linearization function. All modules are DIN-rail mountable and have UL approvals.

www.weidmuller.com

Stainless steel hinges

J. W. Winco has announced the GN 237-NI series RoHS compliant stainless steel hinges



with countersunk thru holes. Both the hinge body and pin are constructed of stainless steel. A zinc die-cast version with black powder coated textured finish is also available. For certain minimum quantities, an aluminum version of the hinges is offered upon request. Various metric and inch size fasteners and kit packages are also available.

www.jwwinco.com

Sound datalogger



Sound datalogger plugs into computer. The Sound Lever Datalogger ST-173 from Reed Instruments plugs directly into a computer. The unit measures from 30 to 130 dB with a accuracy of ± 1.4 dB. Features include a 1/2 in. electret condenser microphone, A & C frequency weighting, Normal (average of 20 data samples) and Peak modes, and an integral USB port. The meter has a data storage capacity of 129,920 samples and comes with a microphone windscreen, transparent cap, software, metal support stand and battery.

www.itm.com

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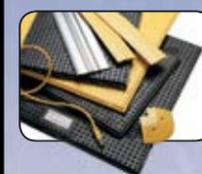
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Medical Engineering

Shedding light on harmful bacteria

By Mark Sunderland

Iatrogenics refers to the adverse effects or complications that are caused by, or result from, medical treatment or advice. It includes medical error, negligence, and the adverse effects or interactions of prescription drugs – and any one of these can be a factor in death, devastation and cost. In the U.S., an estimated 225,000 deaths per year may be iatrogenic.

My own brush with iatrogenics was when, as a child, I had mastoid surgery. The procedure involved cutting into the small mastoid bone behind the ear. The problem was coupled with a contagious fever so I was admitted to an isolation hospital for adults. The windows, much like in a prison cell, were so high on the wall that the only way to see out was to curl my feet underneath me and sit on my haunches. The result was that the mastoid was fixed but my feet were screwed up and I underwent weeks of therapy to enable me to walk.

Bacteria is unseen and is easily transferred to and from the body (usually by hand or mouth) and the control of this transfer has become a major hospital concern – hence the plethora of hand sanitizing pumps that are now installed in hospitals and, if in doubt, salute your friend – don't shake his hand.

Research at Manchester Metropolitan University in the U.K. is currently exploring the potential for new nanotechnology paint surfaces on walls and ceilings that could serve as a powerful antimicrobial agent when activated by fluorescent lighting. Antimicrobial paint surfaces on floors and ceilings could be ideal for wards, clean rooms and operating areas.

The paints contain nano-particles of titanium dioxide, the white compound that is used as a brightener in commercial paints and sometimes for the bright white lines on tennis courts. The nano-



Surfaces throughout an operating room are particularly susceptible to harboring invasive microbes.

particles kill bacteria and destroy dirt when they absorb UV light and they also produce active molecules that can clean the painted surfaces.

The research at Manchester examined the reaction to the bacteria E.coli, the dangerous food poisoning superbug, on a variety of acrylic paint formula with titanium nano-particles and its survival/growth under various types and intensities of light. Over a 96-hour period when a test surface was exposed to constant fluorescent lighting of the conventional type, researchers found that paints with higher concentrations of the nano-particles were more effective at killing bacteria than paints with additives such as calcium carbonate, silica and talc – the presence of calcium carbonate actually decreased the efficacy by as much as 80%. The research is continuing to explore the potential of other additives that may further enhance the destruction of pathogens. The effectiveness for a germicidal paint could likely remain for a period of three to five years depending on its environment.

The impact of light as an agent to the potential destruction of bacteria is also being studied at University College

in London. A process that involves an innocuous green dye and a near-infrared light may prove to be an inexpensive and effective treatment for wounds and ulcers that don't respond to conventional antibiotics. Infection of post-surgical wounds is a serious problem that annually affects thousands of hospital patients.

Led by Dr. Ghada S.M. Omar, the investigating lab showed that 99% of the potentially dangerous MSA bacteria (methicillin-resistant staphylococcus aureus) could be killed with indocyanine green dye. When the dye is zapped by a near-infrared light it releases toxic molecules that rapidly kill the bacteria. The research team also found that even with very low oxygen levels in damaged tissue, the light activated dyes will continue to destroy most of the dangerous bacteria including 70% of the most drug-resistant bacteria in hospitals.

With the increasing resistance of many organisms to conventional antibiotics, the light and dye approach to wound treatment may eventually be the only anti-bacterial method of control. *Mark Sunderland is President, BioMedical Industry Group, Ottawa (mark@biomedgroup.com).*

Power Transmission

Belt-driven actuators



MXB-P belt-driven linear actuators from Tolomatic feature a carriage that employs THK Caged Ball bearings, and are capable of velocities of up to 3810 mm/s and accelerations of up to 30.48 m/s². The actuators feature a polyurethane high-torque drive (HTD) tooth profile drive belt with steel tensile members to resist stretching. Belt tension can be adjusted through an open slot in the guide plate without disassembly of the actuator. The actuators are available in six models ranging from 16 to 63 mm. Stroke lengths are configurable in increments up to 5.0 m.

www.tolomatic.com

Wind turbine couplings



Zero-Max, Inc. has introduced composite disc couplings for the wind turbine industry. The couplings have been tested under conditions simulating a 20 year load spectrum of continuous operation. Depending on application, the Zero-Max's centre spacers can be machined out of steel, composite glass fiber or 6061-T6 aluminum. Through the use of finite element analysis, the centre spacers can be engineered to withstand in excess of 70,000 Nm of torque depending on the material selected, and operate from -57° to 121°C.

www.zero-max.com

Chain guides made to order



One-piece design SlideTrax chain guides from Slideways for curves and straights used for side flexing and straight running, are said to be made to exact radius requirements and incorporate proper guide clearance for new conveyors and refurbishing existing ones. SlideTrax curves can be made in a range of materials: UMHW formulation or MD-nylon. Typical centre line radius of 18 to 36 in. for curve sections can be furnished depending on chain model curve section requirements. Custom sizes and materials are also available.

www.slideways.com/slidetrax.html

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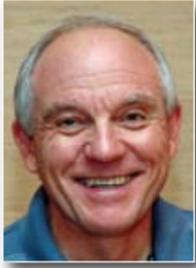
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Advisory Board Directions



Have you hugged a salesperson today? There's value in partnering with customers

By John Bachmann

Hugging one of the sales reps making a sales call on you may be one step farther than you're willing to take – but those on both sides of the buying and selling processes in industry have a lot to gain from a better understanding of these processes and each other.

Recently, I had the privilege of explor-

ing these topics with more than 20 people currently employed by distributors and manufacturers when I taught a course in Marketing, Sales and Customer Service in Industrial Distribution at Mohawk College in Hamilton.

The students, with an average of more than 10 years work experience, came from many departments within their companies. Those from inside sales and customer service formed the largest group, but there

were also people from outside sales, purchasing, engineering, production and product management.

Based on feedback they provided, what they took away from the course was varied as their backgrounds. One outside sales rep, referring to calculations we did in the class of the cost of an average sales call, remarked that "I didn't realize how expensive I am!" By the end of the course he had realized that his time is lim-

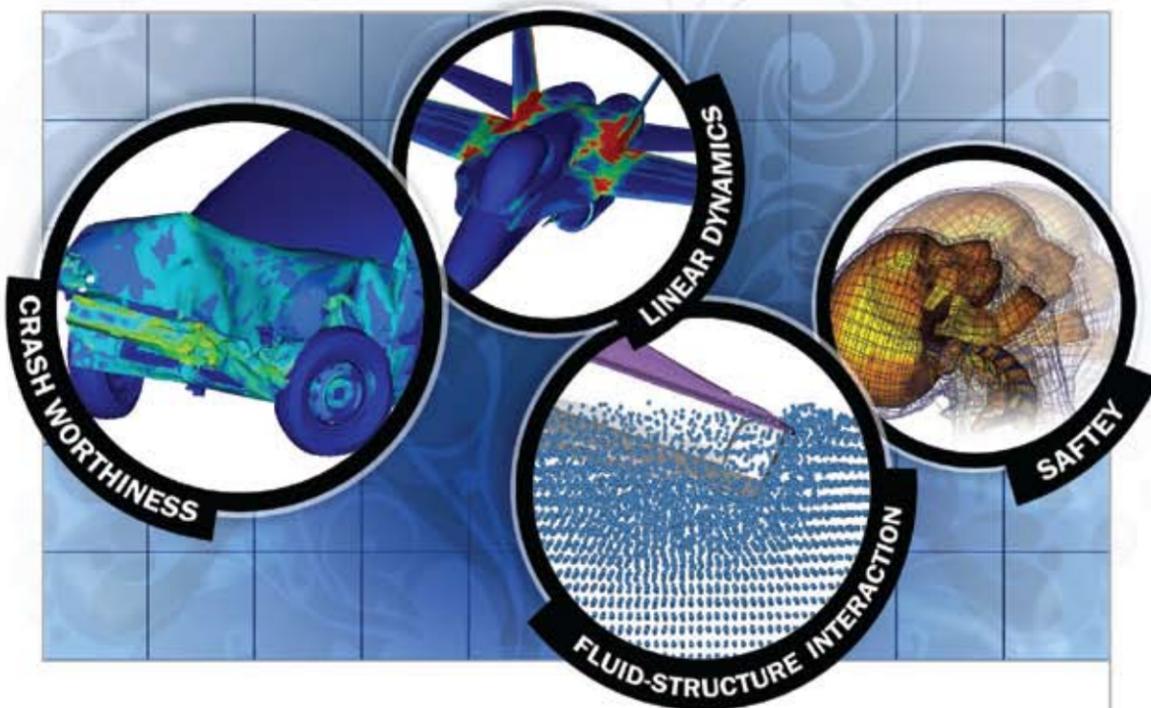
ited and he needs to spend it on accounts whose business can cover his costs. That doesn't mean smaller accounts are ignored. Instead, they're handled more cost effectively by inside sales.

Students in the course heard that good technical sales reps research their customers and their applications and bring value, defined as products or ideas that will reduce costs or increase revenues, with every sales call. But vigilantly controlling the bottom line will be only part of the formula for survival through the next few years. Customer service is going to become much more of a differentiator for both industrial buyers and sellers. One student observed: "Some days by three o'clock have become very stressful and I don't always sound the greatest to my customers. But with [the tips I learned] in this course I have found that I am able to better deal with numerous phone calls, etc., especially on a busy day."

With the cutbacks of the past several years, most manufacturers are running very lean in engineering and relying on industrial distributors and manufacturers

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'I didn't realize how expensive I am!'
– sales rep/student

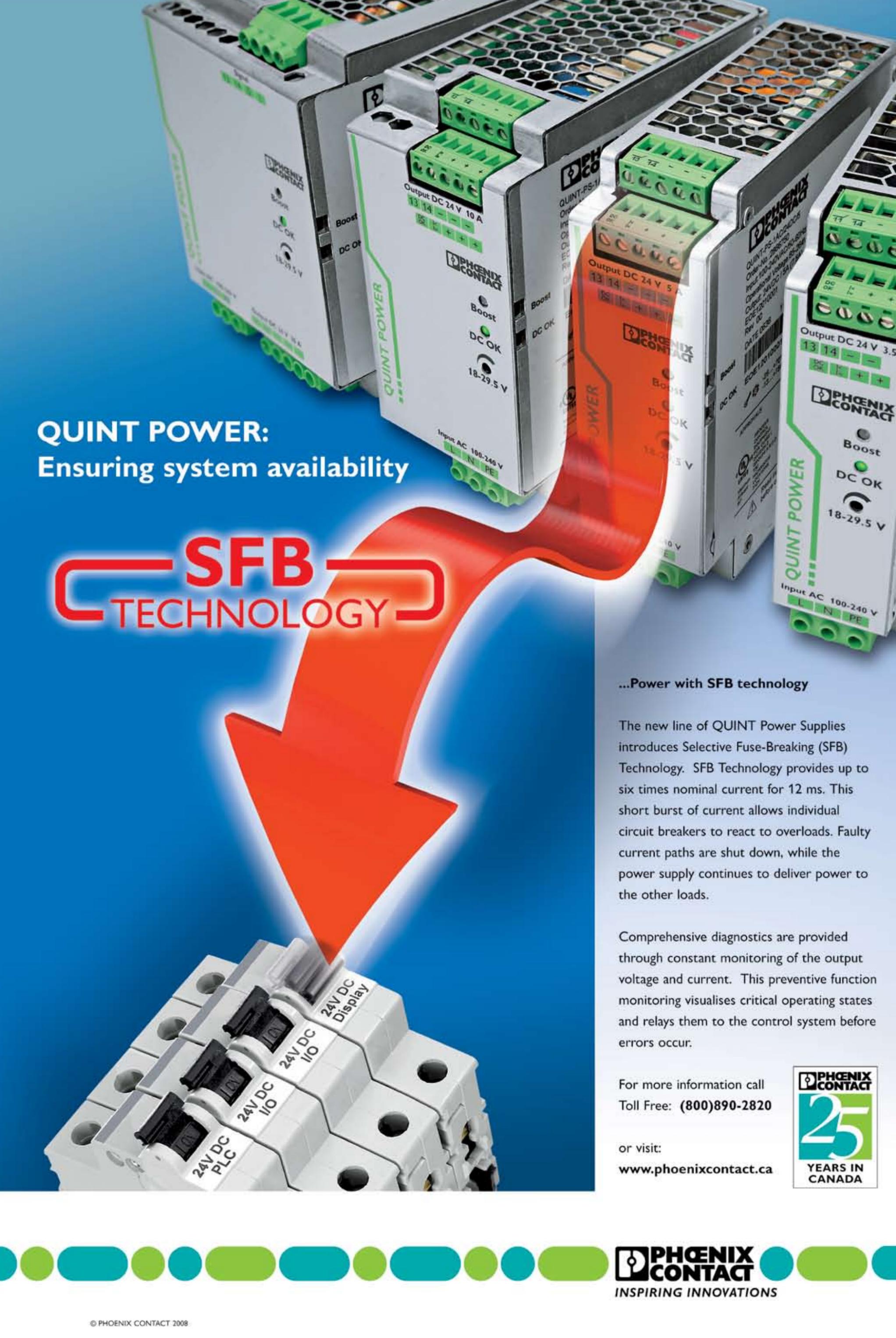
for more technical help. But that level of support costs the suppliers money and needs to be factored into the pricing of products and services. In the course we learned that this can be a win-win situation if a purchase is approached considering the total costs of ownership (TCO) rather than just the initial purchase price. That, however, will require more complete disclosure by manufacturers of operating costs so that suppliers can make their TCO case, which, in turn, will necessitate more of a partnership relationship than traditional, transaction-based selling.

The course also taught that inside any organization, it takes the combined effort of many "internal customers" to make sure that the bill-paying external customers get what they want correctly the first time, every time. One student remarked (with refreshing honesty):

"After learning that I have customers internally too, I understand how they see me as a co-worker. With better understanding of what the rest of my co-workers do on a day-to-day basis, if asked to do something ... I get it done just like they are a paying customer. (Maybe not quite as fast.) But I get back to them a lot quicker than I used to. I have noticed a more positive attitude around the office."

In the end, getting closer to the right technical sales reps who are properly trained by their industrial distribution employers will help manufacturers and other industrial companies compete in the current lean and mean economy.

The Industry Careers Pathway program is at www.industrialcareerspathway.org. In-class courses are available through Mohawk and BCIT and online versions are also becoming available. John Bachmann is the Corporate Sales, Marketing and Quality Manager for Wainbee Ltd. and the Chairman of the Canadian Fluid Power Association.



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Feature: Mechanical CAD

Throwing fire at the sun:

U of T competes in the 2009 Panasonic World Solar Challenge

By Alex Zeltcer

Every two years a special type of car competes in the Panasonic World Solar Challenge, crossing the Australian continent powered solely by solar energy. Teams design and build vehicles capable of completing the 3000 km journey from the Northern Territory to Adelaide, in South Australia. In 2007, the University of Toronto Blue Sky Solar Racing team's

fifth-generation car, Cerulean, finished first among all Canadian entries and fifth overall in its class.

The critical challenge in developing a competitive solar vehicle is optimizing its power-to-drag ratio. The solar panels must be oriented directly toward the sun to increase the power they generate, but this often increases drag, compromising efficiency. To avoid drag, the Blue Sky Solar Racing team is leveraging Dassault Systèmes' Product Lifecycle Management

(PLM) applications to improve its designs. By simply entering the values of each variable for the iterations it is exploring into Dassault Systèmes' CATIA Design Table, the team has generated 60 designs in about five hours, saving approximately 96% of the time compared to conventional methods.

The team's experiments with CATIA's 3D modeling capabilities on the 2007 car were extremely successful. However, in order to prepare for the October 2009 challenge, the Blue Sky Solar Racing team needs to build a master model of the entire car, requiring significant product data management capabilities. For this, Blue Sky has added ENOVIA SmarTeam to its design arsenal.

For the 2009 car, Blue Sky Solar Racing plans to increase its use of the CATIA ergonomic workbenches to improve driver per-



The University of Toronto Solar Racing Team is using Dassault Systèmes CATIA (inset) to model all the mechanical and structural components of the car, as well as ENOVIA Digital Mock-up and SmarTeam.

formance and safety. The 2007 car was a two-seater, but the 2009 car will be a one-seat design that will be more challenging to design from an ergonomic standpoint. The ergonomics capabilities built into CATIA make it easy to define a driver and manipulate him or her during the design process to optimize vision, crash zones, and egress in the event of an accident.

Because of the success of the 2007 model, the team has continued its use of CATIA to model all of the mechanical and structural components of the 2009 car. It is using also ENOVIA's Digital Mock-up (DMU) functionality, which allows users to view the different parts together in an assembly to better understand their relationships and identify potential improvements, which helped the team reduce the weight and number of parts.

ENOVIA SmarTeam manages the CAD and related product data files, preserving all the native CATIA links and references, in a secure electronic vault that eliminates the risk of unauthorized modification or accidental deletion. SmarTeam allows multiple designers to simultaneously work on the same parts or related parts with full knowledge of what their teammates are doing, updating modifications "on the fly" to avoid any loss of edits.

Aventec Inc., a Markham, ON-based CATIA reseller (www.aventecolutions.com), played a key role in preparation for designing and building the 2009 car, and donated the Dassault Systèmes PLM software to the team along with training.

Alex Zeltcer is general manager, Dassault Systèmes, ENOVIA SmarTeam.
www.3ds.com/enovia

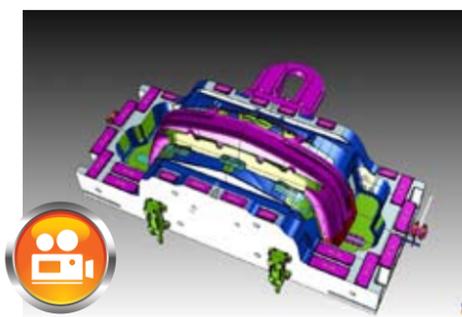
Collaboration delivers high standards

Tycos Tool and Die, a Concord, ON-based provider of automotive tooling, continues to deliver cutting edge products and tooling services thanks to continued collaboration with think3, a supplier of design software that combines product concept, engineering and tooling environments.

ThinkDesign software by think3 provides a single design environment which streamlines design processes and allows for an unparalleled interoperability that dramatically reduces margin of error. This significantly cuts design time and costs which allows products to hit the market much quicker, and directly translates into real benefits to the bottom line.

"We chose think3 many years ago for its high reliability of tooling solutions" said Patrick Radice, general manager at Tycos. "Over the years this has proved successful and thanks to ThinkDesign and HyperCAD we've been able to meet the needs of increasingly demanding customers all over the world."

Tycos has also benefited from the quality of service and support provided by SolidCAD (www.solidcad.ca), an Ontario



Bumper mold designed in ThinkDesign: Tycos typically makes molds for fascias (bumpers), fenders, body side moldings, instrument panels, door panels and other large automotive parts.

provider of software, training and technical support for the CAD/CAM industry. SolidCAD plays an integral role on think3's support team for Tycos, bringing a wealth of experience in the automotive market and in third party applications, such as HyperMill, for manufacturing and hardware integration.

Think3 has released its 2008.1 version of ThinkDesign solutions designed for toolmakers and technicians. ThinkDesign features improvements to the Compensator functions and offers a powerful solution

for calculating the compensation required for sheet metal spring back. The improvements concern mesh loading, calculation, checking and the extraction of curves and points to ensure better performance and optimised results in comparison with the initial shape. The Die Design module, for designing dies in sheet metal environments, is a new module featuring functions that allow users to better define cutting lines and compensate local and targeted GSM spined twist.

Tycos, a division of Decoma International, manufactures medium to large size (up to 50 ton) automotive tooling in the following categories: injection molding, reaction injection molding (RIM), low pressure molding, compression moulding, and hydroforming. It also provides maintenance and servicing on all tooling, both in its plant and at the customer's location. Tycos typically makes molds for fascias (bumpers), fenders, body side moldings, instrument panels, door panels and other large automotive parts.

This article was supplied by think3.
www.think3.com

Product Lifecycle Management Road conference

DETROIT – At the Fall 2008 and 15th PLM Road Map conference presented by Collaborative Product Development Associates, Dr. Ken Versprille of CPDA opened the Design Creation and Validation Track on The Expanding Role of Modeling across the Extended Enterprise. He noted that "product knowledge and content authored in design engineering organizations often fail to flow smoothly into downstream disciplines, forcing non-value added work to extract the content necessary to drive the extended enterprise."

Versprille introduced the first topic of CAD/CAE Model Clean Up with a short summary of the findings from a research survey he conducted earlier in 2008. A complimentary report of the full survey is available on CPDA's website (www.cpd-associates.com). Survey highlighted include:

- 34% of users require a day or more to clean model errors in a typical model;

- 40% of users require a day or more to remove model detail;
- 51% of users indicate that Model Clean Up is "critical" or "important" to their product development process.

Steven Sass, Staff Engineer from John Deere Construction and Forestry, presented their approach to dealing with CAD/CAE Model Clean Up in the area of computational fluid dynamics. Its solution relies on a "multi-CAD" view with alternative CAD geometry representing the same physical entity for different purposes that is supported by abstract modeling.

Rick Langley, Manager of Global Design Services at American Axle and Manufacturing, followed with their approach to CAD/CAE Model Clean Up. It chose the 3D Evolution suite of tools from CORE Technologies to perform geometry healing and defeaturing. He and one of his staff then performed a live demonstration of the technology step-by-step



The PLM Road Map conference had tracks on Design Creation & Validation, Design/Simulation and Mechatronics Product Value Management.

through their clean up process.

Greg Roth of TRW kicked off the Design/Simulation track. He emphasized the major changes in the business model that present the necessity of leveraging up front CAE. The development and implementation of new and faster CAE analysis methodologies involved the retooling of the engineering process to support streamlined

interfaces and automation protocols for CAD and CAE. In the case of CAD/CAE integration for brake calipers, Roth's new processes represent a 25-75% improvement in the time to achieve results.

Craig Brown from General Motors Powertrain opened the Product Value Management Track on Mechatronics on the imperative for the horizontal integration of mechanical, electrical, and software development in mechatronics across the product development cycle – which would represent a dramatic reversal from the approaches in the past that relied on separate silos which integrated their efforts very late in the process.

As one of the fastest growing areas of product development, mechatronics poses challenges in its own right. Massive benefits may be derived from integrating mechatronics innovation into a standard and repeatable process that can be optimized.

Feature: Motion Control

To bus, or not to bus?

By Robert Pearce and Mary McKeown-Christie

A new motion control project has landed on your desk, you know that it makes sense to connect automation components together using a network, but with so many competing networks to choose from how can you make the right choice?

Networks can be lumped into three main categories 1) General-purpose field bus, 2) Hybrid Network, 3) Motion Bus. Broadly speaking, general-purpose field busses send messages when they are needed. This makes best use of the available network bandwidth.

Hybrid networks aspire to combine the flexibility of the general-purpose network with predictable timing for motion control. They support a mixture of scheduled and unscheduled traffic along with distributed clocks. They are capable of sending command values to some number of axes at low cyclic rates such as 1 kHz. Loop closure via the network is not generally feasible with hybrid networks but nevertheless they have an appeal – particularly where the network in question is already in use at plant level.

Motion busses re-construct the clock

from a central controller at each node. This has two principal advantages. Firstly, it allows the time at which an input changes to be accurately (<1µs) measured, or the time at which an output is set to be accurately controlled. Secondly, it allows both position measurements to take place and command values to take effect with predictable timing. For ultimate sensor/actuator precision performance, some networks offer I/Os that perform time or position-related functions at the drives, entirely in logic gates.

The achievable cyclic update rates for motion busses depend on network loading and controller processing capability; communicating with 100 single axis nodes at 1 kHz, or servicing 10 single axis nodes at 10 kHz, are indicative of true motion busses. Note however that although the cyclic rate is the industry figure of merit, control latency is more important so be sure to ask your supplier – especially if you plan to close loops via the network.

Identify your network requirements – determine whether you really need a network with specific MC capabilities.

If there are no requirements in respect

	General-purpose field bus	Hybrid Network	Motion Bus
EtherCAT			
ETHERNET Powerlink			
Ethernet/IP			
Ethernet/IP+CiP Motion			
Modbus TCP/IP			
PROFINet			
PROFINet IRT			
SERCOS III			
SynqNet			

Three types of networks and their distinguishing characteristics.

to timing, latency, throughput, simultaneity or determinism, a “vanilla” Ethernet-based network bus would suffice.

If there are complex requirements however, a network with specific motion control capabilities is essential. Some of the advantages of using a network to carry the position information include; inter-axis linkages can be performed using the network; there is no need to hard-wire any motion functionality; and all motion may be executed with deterministic timing.

The authors are with Danaher Motion. www.danahermotion.com

Timing belts and pulleys



BRECOflex offers a wide range of finished precision metal pulleys, as well as high precision timing. The company has also announced its new production facility for made-to-order pulleys with “state-of-the-art” CNC machine tools. Finished pulleys made-to-specification and stock pulleys with pilot bores, are available. Made-to-order pulleys are also available with normal backlash, reduced backlash “SE” or zero backlash “0” tooth gap design.

www.brecoflex.com

Reciprocating linear drive



The Amacoil/Uhing model RG linear drive features mechanical control over travel direction and linear speed, and is said to eliminate the need for an electronic control system. Reversal of travel direction is automatic regardless of the speed or rotational direction of the shaft. Length of travel is increased or decreased using manually set end stops. Travel speed may also be regulated using a manual control on the drive unit without requiring changes to motor speed or gearing. Available in 17 sizes, the RG drive meets axial thrust requirements from 7 to 800 lb. Backlash is eliminated with machined “rolling ring” bearings which maintain constant point-contact with the shaft. When the shaft rotates the rotary motion is immediately converted to linear motion output. There is no play or free movement between shaft and bearings including during reversal.

www.amacoil.com

Monocarrier linear actuator



The MCH Series Monocarrier linear actuator from NSK is said to aid in streamlining the design and assembly of many automation applications. Also said to be lightweight and compact, the single-axis linear actuator combines NSK ball screws, linear guides and support bearings. The all-in-one structure also enables the significant reduction of design and assembly times and costs, the company says. In addition, the rail design makes it capable of functioning as a beam member in machine structures. All Monocarrier products are RoHS compliant.

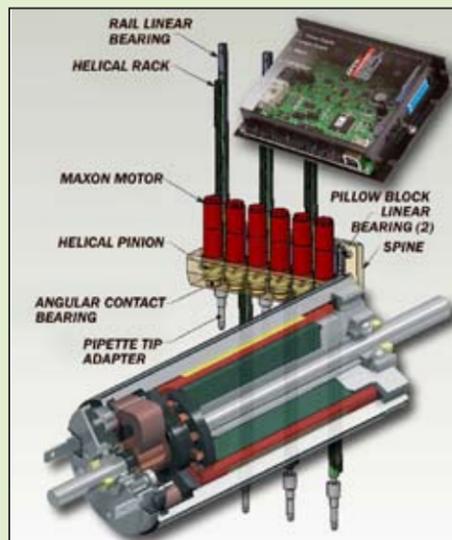
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Automated multi-probe pipette system boosts laboratory production

When a lab automation systems integrator came to linear drive specialist IntelPro, Inc. (www.intellepro.com), it was facing a serious challenge. The company needed a system that would accommodate pipettes on 18 mm centres. The system also had to be capable of driving six probes independently with a 5 in. stroke. IntelPro worked closely with a biotech integrator (Protodyne, recently acquired by Lab Corp.) in both the design and development of the pipette automation system to ensure the performance and life expectancy required by Protodyne’s “Radius” line.

IntelPro recognized an opportunity to expand its product offering to include an ultra-compact, programmable displacement head. The new system would feature the 18 mm probe centres and strokes up to 125 mm. A typical linear pipette head contains six or more probes on 18 mm centres, although other configurations, probe adapters and centres can be custom built as requested. Overall, the unit offers superior performance and accuracy with up to a 30% improvement in processing over traditional pipette automation systems.

A key component in the multi probe head is IntelPro’s helical linear drive technology, which employs a helical rack and pinion with the drive motor parallel to the rack’s major axis. This design reduces head size and part count to extend the reliability and life of the Pipette Automation System. In addition, the system’s resolution is governed by gear reduction ratio and rotary encoder line count to easily adjust for unmatched performance in speed, force, smoothness and resolution.



Maxon’s RE13 motor is an integral part of the pipette system (bottom), providing critical specifications including specific torque, smoothness, and accuracy. Top right: The Maxon EPOS (Easy to use POSITIONing System) digital positioning controller designed to control brush and brushless dc motors with encoder.

Some of the design challenges for the pipette system included the need for a mechanism that would withstand substantial axial loads during the pressing on of the pipette tips. It was found that the system also needed to have adequate motor thrust, enough to overcome a pierceable foil that required 0.5 lb of thrust, and pierceable caps that required 1.6 lb of thrust. Finally, the system acceleration and deceleration speeds would have to be slow enough to prevent liquid from splattering.

During the design phase of the Pipette Automation System, IntelPro evaluated and selected to use Maxon Precision Motor’s RE13 dc brushed motor to drive

the system. These moving coil motors, with Neodymium magnets, are particularly designed for long life, low electrical noise, and high efficiency. Maxon’s motors, combined with planetary gear-reduction, are used to drive helical racks carrying pipette tips. Encoder feedback assures smooth servo controlled displacement motion, while tandem recirculating linear bearings provide precision and repeatability. Maxon motors were primarily chosen to satisfy the size and torque requirements of the end product. The RE13 motors offer the user up to 2.8 mNm of torque. They also work within an ambient temperature range from -20° to 65°C.

Smoothness of operation and freedom from cogging is also critical for the application. Cogging could impede the motion of the pipette probe and lead to pipetting errors. The planetary gear reduction and encoders integral to the system allow the motors to facilitate excellent servo control and minimal backlash, resulting in high positioning accuracy and long life. The ironless rotor design of the motor is what allows for zero cogging, a significant aid in the motor’s simple and accurate control.

According to Don Rich, IntelPro’s project engineer, “Without the power and compactness of the Maxon motors this product could not have been built.” In fact, in the works is an advanced version of the automated multi-probe pipette system based on the same Maxon motors with only 9 mm between probe centres.

This article was provided by Maxon Precision Motor.

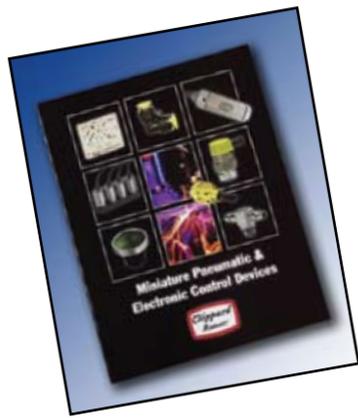
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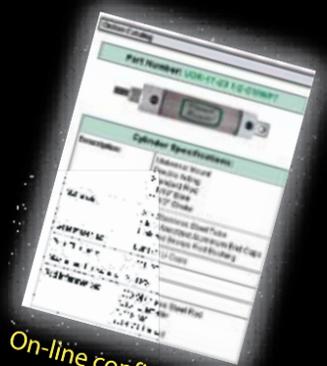


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