

D P N

DESIGN PRODUCT NEWS



January/February
2008

Covering the total design engineering function in Canada



Soft material insert fasteners

Avdel Versa-Nut is a blind insert fastener that doubles the grip range on soft materials, thin-walled plastics and composites, and is said to provide new levels of joint clamp and pullout resistance with fewer fasteners. With a grip range of 12.7 mm, the insert fasteners install in 3 s.

avdel-global.com



Compact M8 splitters

Turck has introduced M8 picofast splitters consolidate two M8 picofast or two M12 eurofast connector branches into one M8 connector. The splitters are mounted with molded-in mounting holes. Units provide NEMA 1, 3, 4, 6P and IEC IP 67 protection, and are rated for up to 125 V and 4 A.

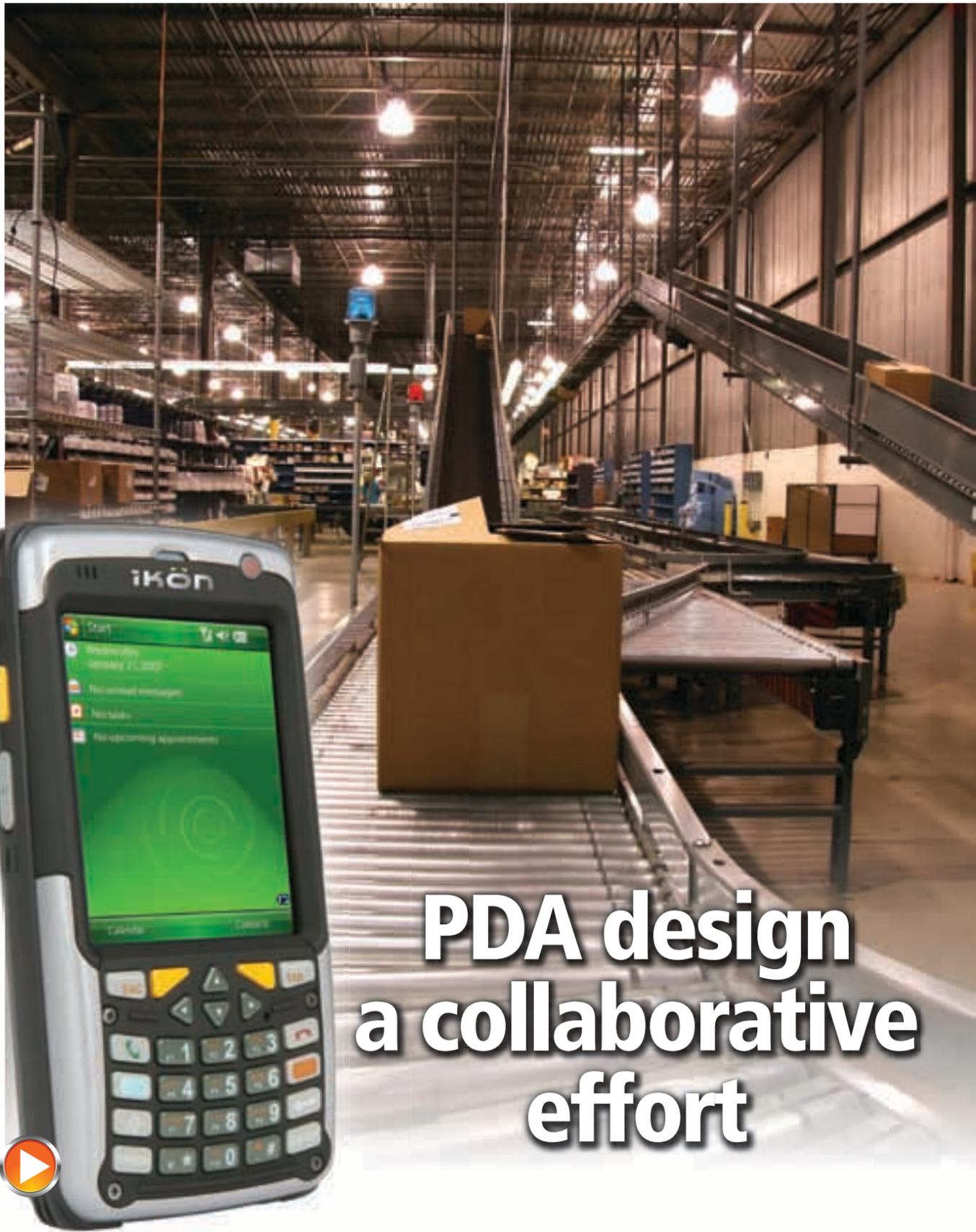
chartwell.ca



Hybrid linear actuator

Haydon Switch & Instrument has introduced the 28000 series (Size 11) double stack captive hybrid linear actuator. Frame size is 28 mm square, resolutions range from 0.003175 mm per step to 0.0508 mm per step and thrusts of up to 133 N are available.

hsi-inc.com



PDA design a collaborative effort

By Mike Edwards

Mobile technicians and warehousing personnel now have a sophisticated, but rugged PDA to add to their tool belts. Psion Teklogix Inc. of Mississauga, ON (psionteklogix.com) recently announced the collaboratively designed Ikôn PDA (personal digital assistant), to increase the productivity of mobile workers.

The Ikôn unit combines an integrated imager or scanner with a standard color camera for data capture, as well as provides wireless voice and datacom with simultaneous WiFi, cellular or Bluetooth connectivity options. The result is

an IP65 rated PDA with a 3.7 in. VGA display that can provide real-time information management to improve efficiencies and increase asset visibility in areas such as transportation, utilities, couriers, forestry, HVAC, mobile merchandising and a variety of field service applications.

The new product is a natural evolution from devices historically created by the UK-based Psion Group, developers of the Psion Organizer, the first volume production PDA in 1984, and Teklogix, the Canadian maker of wireless devices for the logistics industry that was founded in 1967. The two companies merged in 2000 and continue to perform product development on both sides of the Atlantic.

Geographical disparities both within Psion

Continued on page 7

Volume 36 Number 1

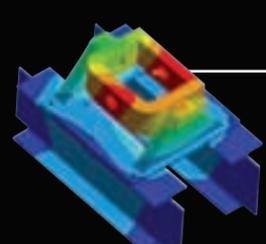




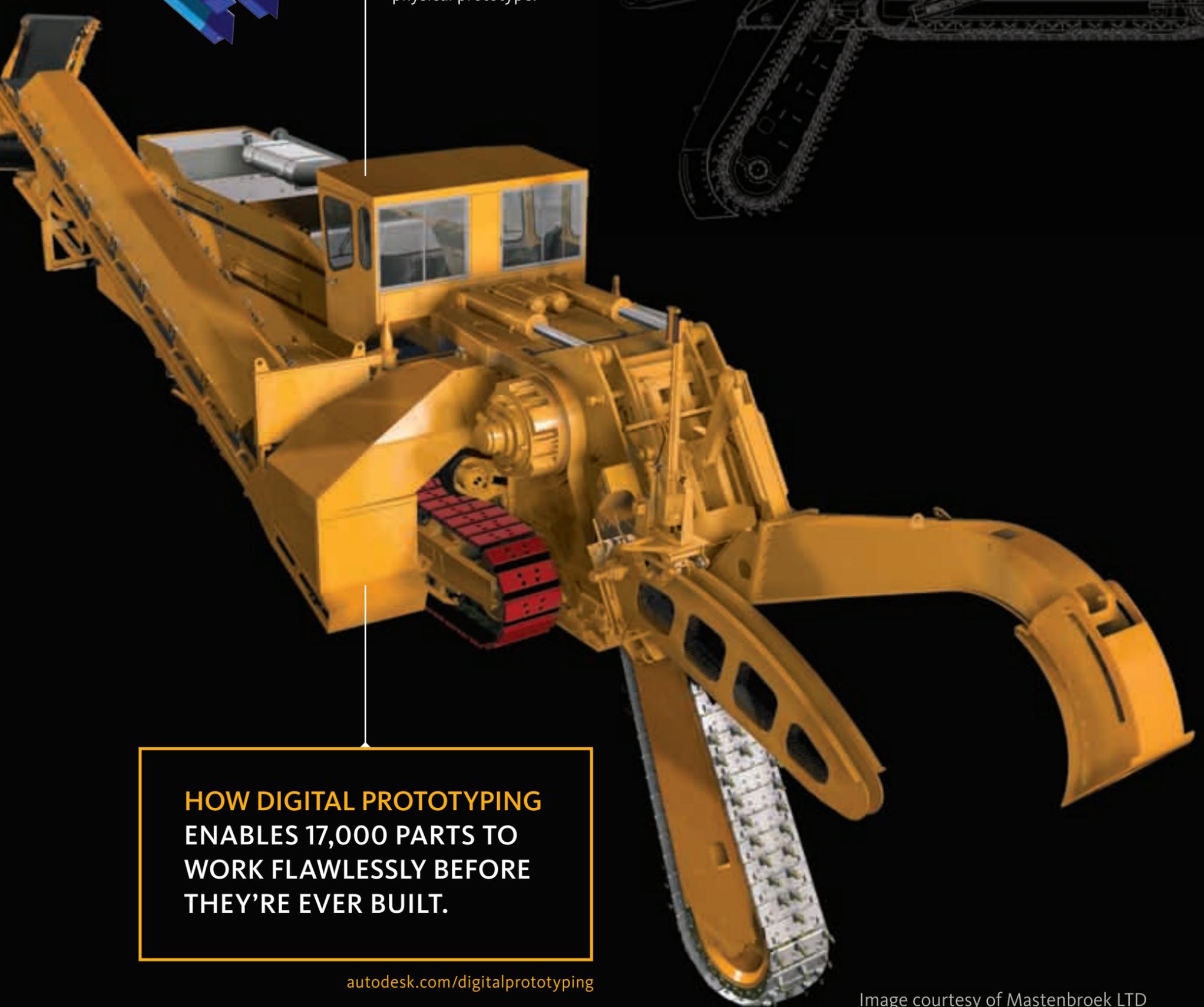
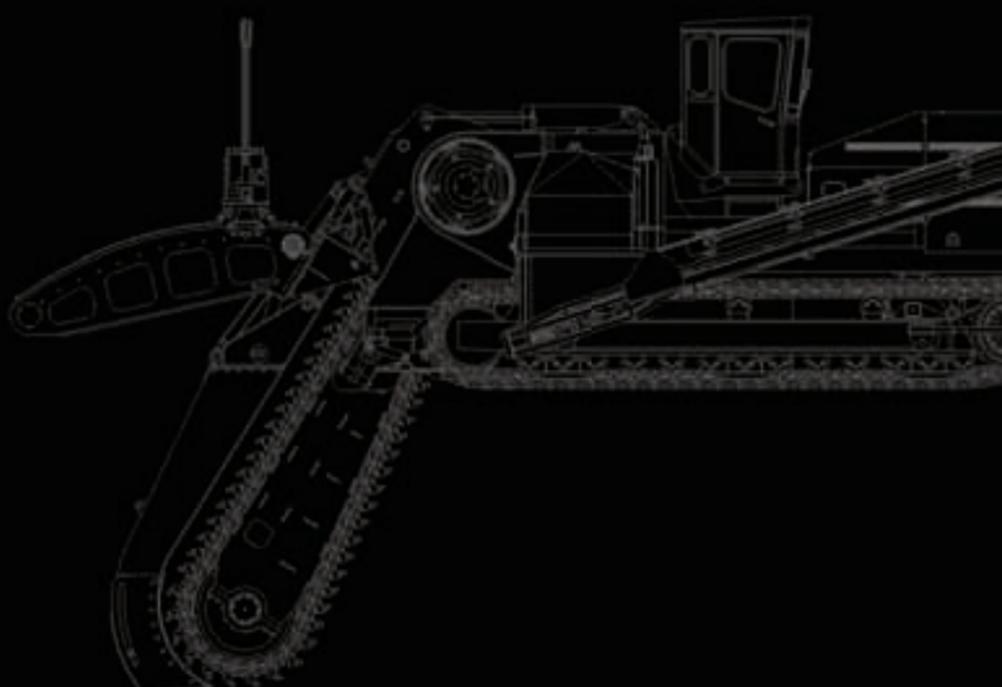
CREATE – Build a digital model using Autodesk® Inventor™ software to define form, fit and function.



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SPECIFICATIONS

C-more micro	
Screen Size	3 inch
Pixel Resolution	128 x 64
Lines of Text (max)	10
Characters per Line	21 dynamic or 32 static
Beeper/Buzzer	Yes
Graphics	Yes
Agency Approvals & Certifications	UL, cUL, CE, RoHS, NEMA 4/4X indoor use
Memory	768 kB
Programming Software Price	FREE download or \$25 for CD
Number of Screens	999 Screens Max, limited by memory

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In this issue



By Design

Roller bearing application training

NTN Bearing Corp. of Canada offers comprehensive hands-on training with its Roller Bearing Application and Maintenance Seminar series. In addition, engineering and maintenance specialists get a chance to discuss solutions to technical problems with experienced NTN engineering personnel.

FEATURES:



Integrated drive and motor units do more with less

Bosch Rexroth Canada technology puts drive electronics directly on to motor for a reduced footprint



Small precision ball bearings allow design miniaturization

Spotlight on Power Transmission features broad range of components



Welding cell audit can save repetitive downtime

Balluff advises on how to reduce sensor damage from slag, impacts

DPN DESIGN PRODUCT NEWS

DIGITAL EDITION

January/February 2008



DPN editor
Mike Edwards

Explore this fully interactive digital edition of *Design Product News* magazine @ dpncanada.com

I hope you will fully explore and enjoy this user-friendly new tool to help you get the invaluable design engineering information you've come to expect from *DPN* for more than 35 years.

To help you out here are a few simple user tips:



Contents page: move your mouse to the bar top left and you can pull down a contents page menu and quickly find the feature you are looking for.



Find (Search) window: Enter a keyword and the search results instantly appear allowing you to navigate quickly to that page. If you know the page number, just type it in the box to the far right, hit enter and you are there.



Mousing around: See something you like? Click your mouse over that part of the page and it will quickly zoom into focus. Click again and you zoom back. Click and hold the corners of the pages to move forward, or hold down your mouse button and flip the pages. Also use your mouse to scroll up and down while reading.



Interactive stuff: You'll also 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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Putting "design" into products imperative for Canadians

3D in DPN Online Edition

Look for the 'DPN 3D' logo throughout this issue and go to DPN's online PDF edition at dpncanada.com to view images in 3D.



Also look for the play button to view video clips.



Renderings



Designers add value to products and make manufacturers more profitable, competitive

By Mike Edwards, Editor

What would you say if asked to name the top three “design rich” urban areas of North America? If the Greater Toronto Area (GTA) came to mind, right after New York City and Boston, then you would be correct.

According to Arlene Gould, strategic director of the Design Industry Advisory Committee (diac.on.ca), the City of Toronto wants to use that concentration of design talent to attract investors.

To do this, the committee – commissioned by The Greater Toronto Marketing Alliance (GTMA) – undertook a study of the design workforce in Ontario to determine the potential of designers to create greater economic and social advantage. The study (published at greatertoronto.org), funded in part by the Government of Canada’s Labour Market Partnerships Program, focused on the disciplines of industrial design, architecture, landscape

Use design to improve products and promote brands

architecture, fashion, graphic and interior design that account for close 40,000 designers in the GTA.

“What does a maker of plastic housewares have in common with an automotive testing equipment provider and the developer of the world’s most advanced ultra-filtration membranes?” Gould asked in her report. The three companies are Umbra, D&V Electronics and Zenon Membrane Solutions (now part of GE Water & Process Technologies).

“These companies are all advanced manufacturers. They are based in the Greater Toronto Area. They have won global recognition for product excellence. And they connect design to their business strategy.” The research identified the three companies as design-led manufacturers because each of these companies has used design to improve their products and to promote their brands internationally.

Finally, in integrating design with competitive business strategy, according to Gould, the companies featured in the study demonstrate seven best practices:

1. Entrepreneurial Leadership. The history of innovation at these companies has been directed by dynamic, entrepreneurial leaders with a strong vision of how to make products better by design.
2. R&D Linked to New Product Design. These companies have world-leading track records in the rapid commercialization of innovation. To facilitate this transformation, they have leveraged design thinking and integrated design capability into the early stages of the product development process.
3. Adding Value Through User-Centred Design. The companies have worked with local designers to reduce costs in production and to enhance the performance, quality, accessibility, value and

aesthetic look of their products in order to maintain a competitive advantage. Their products have become the showstoppers at international trade fairs.

4. Long Term Relationships with Designers. The companies have worked in long term relationships with design consultants. One company, Umbra, also maintains a large, multi-disciplinary design team comprised of industrial and graphic designers and one engineer.
5. Investment in Brand and Communica-

tions Design. The companies have invested in state-of-the-art communications design to build global awareness of their brands and to articulate the features and benefits of their products and services.

6. Reflecting a Culture of Innovation in the Workplace. Each of these companies has used design to celebrate and reflect a culture of creativity and innovation in the workplace. In each case, the workplace environment reinforces the company’s values with employees, clients and suppliers.

7. Research Relationships with the Local University and College Network. These companies all employ co-op students, and they have built research and advisory relationships with faculty and students in the strong university and college network in the region.

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

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By Design

NTN roller bearing application and maintenance seminar

By Mike Edwards

MISSISSAUGA, ON – NTN Bearing Corp. of Canada (ntn.ca) recently hosted its Roller Bearing Application and Maintenance Seminar, an ongoing service to NTN distributors and end-user customers.

For those in industry whose duties include the installation and maintenance of anti-friction bearings, the seminar is invaluable. Engineers active in machine design can also benefit from the hands-on environment of mounting a bearing unit to a shaft to understand the implications of their designs on field service personnel (a recent mechanical engineering grad who wasn't in the seminar told me he'd never had the opportunity at engineering school to put his hands on a real-life roller bearing).

Lead course instructor Marcus Wickert, NTN Canada manager of Technical



Marcus Wickert, manager of Technical Resources, NTN Bearing Corp. of Canada, and the course instructor lead dimensionally equal roller and cylindrical bearings have different load capacity ratings.

Resources, referred to his department as “a support group behind the suppliers.” His instruction included tips on bearing failure forensics (such as examination of the lubricant), explaining that the method can adversely affect the diagnosis. “Don't wash the bearing or blowtorch it before taking a lubrication sample.”

Specifying a bearing for an application requires the proper knowledge, too. “Dimensionally equal roller and cylindrical bearings have different load capacities,” said Wickert.

Heat and axial or thrust loads shorten the life of bearings, according to assistant instructor Randy Ike-nouye. “Bearing unit installations must also be performed with care. Check the mounting surface to see if shimming is necessary and watch for excessive set screw tightening and overgreasing, which can pop the seals to create even more heat.”



FIRST LEGO League Ontario regional Champion's Award winning team SCS Penguins of St. Clements School in Toronto. The team's programmable robot performed flawlessly in the competition.

Energy challenges underpin robotics competition

OAKVILLE, ON – Middle school student teams from across Ontario met at St. Mildred's-Lightbourn School here recently in the 2007 provincial championship of the FIRST LEGO League (firstlegoleague.org) robotics technology competition.

Using LEGO Mindstorm technologies and LEGO play materials, the 10- to 16-year-olds worked alongside adult mentors to design, build and program robots to solve the real-world challenges of energy consumption in a game format. The FLL competition is judged in four areas: project presentation; robot performance; technical design and programming the robot; and teamwork.

“The FLL Challenge helps students discover how imagination and creativity combined with science and technol-

ogy can solve real-world problems,” said Dorothy Byers, Head of Senior School, St. Mildred's Lightbourn. “This year's focus on energy introduces them to various energy source and the challenges we have in obtaining and maintaining clean and efficient forms of energy.”

The challenge for students was to use a robot to transport game pieces such as a hydrogen car, hydro-dam, wind turbines, power lines, roof solar panel, wave turbine and oil barrels around a 4 x 8 ft game grid.

The Ontario regional (fllontario.org) Champion's Award went to the SCS Penguins team from St. Clements School in Toronto. The team will have a chance to participate in the FLL World Festival April 17-19 at the Georgia Dome in Atlanta.

Nord Gear raffle for charity



Nord Gear's annual VIP Golf Classic again featured a charity raffle, with this year's proceeds going to the Children's Wish Foundation of Canada. The Raffle raised \$9,620, which was accepted on behalf of the Foundation by Sandra Hancox, Ontario Chapter Director and Ulana Kopynsky of the CWF. Nord Gear is a global manufacturer of drive systems. Photo: Denis Dryburgh, president Nord Gear Canada (left), Ulana Kopynsky and Sandra Hancox, CWF, and G.A. Kuechenmeister, president & founder Getriebbau Nord.

News in Brief

Machine guarding

Vickers-Warnick has launched “Bridging the G.A.A.P.” (Guarding and Assessment Process), a service designed to provide Ontario manufacturers a program for machine guarding and machine safety applications (vickers-warnick.com).

ITM grand opening

ITM Instruments Inc. (itm.com) has moved to offices in Newmarket, ON. The new building has a showroom, a laboratory with 6 clean rooms and a larger warehouse.

Gates Foundation gift

The University of Waterloo has received a US\$12.5-million gift from the Bill & Melinda Gates Foundation for its youth outreach program in mathematics and computer science.

Conestoga donation

Schneider Electric (schneider-electric.ca) recently donated \$78,000 worth of automation equipment to the Conestoga College (conestogac.on.ca).



Jim Cooper of Maplesoft.

Toyota, Maplesoft form partnership

Waterloo, ON – Maplesoft (maplesoft.com), a provider of software tools for engineering, science, and mathematics has announced a multi-year contract with Toyota Motor Corp. The partnership will produce physical modeling tools to help Toyota move to a new product development process. According to Jim Cooper (left), president and CEO of Maplesoft, “By describing the complex, acausal relationships of a physical model in a clear and efficient way, Maple software enables simplification and optimization, taming the complexity of large models and reducing development time.”

E-T-A and X Tronics join forces

RICHMOND HILL, ON – E-T-A Circuit Breakers has announced that X Tronics (xtronics.ca) will represent the E-T-A line of electronic automation products in Western Canada. E-T-A has introduced a line of circuit control products design to reduce downtime of automated equipment. Photo: Claude Hajji, CEO of X Tronics (left); Bob Ashmore, GM of E-T-A; Katherine Turfryer, distribution manager of X Tronics.



Professor Doug Daniels (left) of Mohawk College, John Bachmann of fluid power distributor Wainbee and chair of the Canadian Fluid Power Association, and professor Donald Wang of Centennial College.

Association addresses college curriculum relevancy to fluid power industry

The Canadian Fluid Power Association (cfpa.ca) addressed technology education with a recent breakfast meeting panel discussion. CFPA members heard Donald Wang of Centennial College and Doug Daniels of Mohawk College speak of how their respective institutions were responding to industry needs. “The Mohawk Fluid Power program is undergoing a renewal in consultation with industry partners,” said Daniels. Wang noted his college now has a functioning production line to educate students.

Calendar

March 3-7, 2008. Burlington, ON. Design Considerations for Hydraulic Systems seminar presented by Bosch Rexroth Canada (boschrexroth.ca/training).

March 12-14, 2008. Las Vegas. IFPE 2008 Technical Conference (ifpe.com) on fluid power, automation and mobile hydraulics.

March 26-27, 2008. Toronto. Advanced Manufacturing Expo, including the Assembly Canada and Canadian High Technology Shows, presented by the Society of Manufacturing Engineers (smecanada.ca/assembly).

May 12-14, 2008. Montreal. Montreal Manufacturing Technology Show, including the National Factory Automation Show, presented by the SME (smecanada.ca/montreal).

See more events @ dpncanada.com

Cover Story

PLM keeps new PDA product development on track

From Front Page

Teklogix operations and with its global contract manufacturers have led it to implement PLM (product lifecycle management) software from PTC of Needham, MA. The company uses the PTC Windchill Suite of PLM and Engineering tools, including PDMLink, ProjectLink, PartsLink, Supply Management and ProE CAD integration.

Keeping track of all the suppliers of the component parts for products such as the RoHS compliant Ikôn PDA was becoming an increasing challenge, according to Dan Meringer, manager, Hardware Support at Psion Teklogix: "We wanted the added integration that Windchill offered and began the implementation process three years ago. We were tired of 'FTP-ing' files."

Prior to Windchill, Psion Teklogix managed its CAD data with PTC Intralink, a department-based product data management software system. The company has also had close to 15 years of using Pro/ENGINEER, PTC's 3D MCAD solid modeller.



The Ikôn PDA is a complex assembly that requires the horsepower of a complete product lifecycle management system like Windchill to coordinate. Psion Teklogix celebrated its 40th anniversary in 2007.

When deciding on a PLM system, the company performed due diligence on some Windchill competitors in the marketplace. "Collaborative viewing of CAD files was also important – other PLM tools zipped them, making sharing more difficult," said Patrick Chin, PLM Program Manager.

ProductView, a low-cost visualization tool from PTC that also works inside the Windchill environment, provided a benefit to the company immediately. "Having everyone on Pro/E to visualize files wasn't financially viable when the cost of training and software licenses was taken into account," said Meringer. ProductView has also provided personnel such as field service technicians to have a view of models, and has helped to generate animations of the latest product revisions for marketing purposes, technical training and work instructions in the assembly and manufacturing processes. The company had relied on Polaroid photographs and videotapes to provide the same instructional information.

Manufacturing engineers can also use Windchill and ProductView to work out flow processes, even without physical prototypes. Technical publications illustrators can use the software environment to create

assembly and manufacturing instruction materials. Tech pubs can now be generated in parallel to other product development tasks, where they often used to take as many as six months to publish.

Windchill ProjectLink allows for the release of Psion Teklogix 3D CAD models or work-in-progress items to contract manufacturers (CMs) worldwide on a "pull" rather than "push" basis. CMs can then review, annotate, create cross-sections, note manufacturability concerns, perform mold flow analysis and attach results to a model. Alerts requiring immediate action or feedback can be sent using ProjectLink.

"It's like having a secure shared network drive between all of our approved vendors and manufacturers," said Steve Ponikvar, Group Leader, Mechanical Engineering. He said that with a PLM system, "standardized processes have emerged so that nothing gets missed – things such product history and discussion threads are all there." In addition, Ponikvar added that CAD model re-usability and modularity with both PLM and Pro/ENGINEER have been beneficial to speeding product development.

Patrick Chin also noted that the PDMLink module of Windchill ensures that

Psion Teklogix processes are organized efficiently and that traceability is maintained. "Rules can be assigned to every library and product, as well as workflows, approvals and visibility levels. The BOM compare function in Windchill also provides added intelligence when detailed workflow or product history information is required."

Chin concluded: "In 2008, we will be upgrading to PTC Windchill Suite of products to the latest 9.0 release with configuration management and potentially include ECAD integration and MPMLink."

"Our PLM community is very excited about this future functionality."

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Feature: Mechanical CAD

3D scanning technology from Quebec goes beyond automotive sector

When an Egyptian science museum wanted to create a gigantic 10-foot tall human heart for an exhibition, it contacted Michigan-based Millit5 (millit5.com) to perform a 3D scan and reverse engineer a fist-sized human heart model, and then create a 10-ft tall walk-through heart. Millit5 typically does automotive scanning and milling projects for the world's leading automakers.

According to Millit5 president and CEO Kim Gruber, "The free form shape

geometry of the human heart is like the class-A surface of an automobile with all the blends and contours that make up the car body."

For the museum project, Gruber used the best methods, practices and processes his company taught to Ford Motor Company's Product Development stylists and clay modelers over the past 12 years, insuring that the huge heart was authentic to form and shape – all based on ISO 9001 standards – and held the milling

data to a tolerance of ± 0.03 mm.

The technology used to complete the project included VxScan data acquisition software and a REVscan laser scanner from Creaform Inc. of Levis, QC. The software driving the scanner produces a real time surface rendering visualization on a computer monitor as you scan. The scanning method requires a technique similar to spray-painting a model. You see what you're scanning in real time, and can repair any holes or voids in the data

or satisfy any other specific requirement on the spot. This eliminates the need of having to rescan. Moreover, VxScan automatically generates .STL files instead of point clouds. REVscan's new technology and better algorithms have also improved the 3D morphing process and the eventual milling of the final results.

By using .STL files that are directly generated by the REVscan for prototype wood, metal and clay milling, processing time can be cut by 60-80%.

The STL's new mesh aspect ratio quality needs no post processing for CNC milling, CFD software requirements or even model morphing, thus saving time at each step. The REVscan's lightweight and compact design, as well as its ability to scan concave and convex shapes, produce outstanding flexibility when scanning holes. The REVscan scanner has an umbilical cord, which facilitates a 360° capture of data for hole openings or the most complex surface contour. All scanning is based on line of sight during data capture, which is the same as 3-axis view dependant CNC machining. The scan data captured with a single scanning of the object with the REVscan were used to do all the engineering data changes, data morphing, digital rendering, 3D walk through video and CNC machining for the finished 10-ft tall heart.

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A worker puts the finishing touches on museum "walk-through" heart. Inset: Model of heart from 3D scan.

Once the heart model was scanned and the data perfected, the next challenge was to modify the heart data so that it would sit in the museum on a stand that would encourage visitors to walk through it. A human heart is not the optimum shape to fit on a platform. It took some innovation to first morph and shape the data until it would fit onto one. Then, the heart model had to be evaluated to provide a door opening that someone could walk through, while retaining as much of the interior detail as possible.

The challenge was to create a museum model representing a realistic human heart that would be enhanced with light and sound as a person walked through it. All the heart's chambers and valves are realistic and facilitated the enhancement of lighting and the sounds of a real heart beating. When standing inside the finished heart, looking at the valves, the heart chambers, the "plumbing," and hearing all the sounds vibrating, you can easily imagine that you are standing inside someone's chest.

This article was contributed by Creaform Inc. of Levis, QC.

www.creaform3d.com

Feature: Mechanical CAD

Mathematics software helps advance Maglev train technology

The principal behind a magnetically levitated (Maglev) train is that it floats on a magnetic field, about 10 mm above the guideway. It follows the guidance tracks using changing magnetic fields, created by the linear induction motor rather than an onboard engine.

The complex design of a Maglev train is a disadvantage as the design process is extremely long. Dr. Richard Gran, Director (retired) of Advanced Concepts Laboratories, Grumman, led a project funded by the U.S. Department of Transportation to develop a new model of Maglev trains using superconducting magnets mounted below the vehicle to attract the train to an iron rail.

Analysis of the nonlinear differential equations

The original simulation development process took several months, but Dr. Gran and his team used Maple mathematics software and BlockBuilder for Simulink from Waterloo, ON-based Maplesoft to reduce the design and simulation time from months to just a few weeks.

Lift, propulsion, control and ride comfort are all created from the configuration of the magnets and the large air gap that the control system maintains. During the development of this system, engineers working in propulsion (linear motors in particular), superconductivity, structural dynamics, control systems, and aerodynamics had to develop a simulation that would answer a myriad of design questions, and take human factors such as ride quality into account. Maple provided a common environment, which made this task possible.

The first step in simulating the vehicle was to obtain simulation models for the nonlinear magnet dynamics. Therefore the nonlinear differential equation model was created using BlockBuilder for Simulink and exported to Simulink to build the Simulink Library that ultimately stored all of the Maglev subsystems as building blocks for the final simulation.

Notably, when there is no current in the coils, the vehicle drops under the influence of gravity and the under-carriage hits the guideway. Similarly, when the current in the magnet is very large, the magnet is attracted to the rail and again, possibly hits it. Therefore, the analysis of the nonlinear differential equations resulting from the simulation assumed that the dynamics were unstable.

The team then moved on to the development of the control system, starting with an investigation of the underlying dynamics to understand how best to control the vehicle. The developed linear model allowed the team to use BlockBuilder to analyze the system and, ultimately, to build a block in Simulink.

The goal of the simulation was to model the entire vehicle's dynamics in a system with five degrees of freedom. To simulate the 12 magnet pairs along the bottom

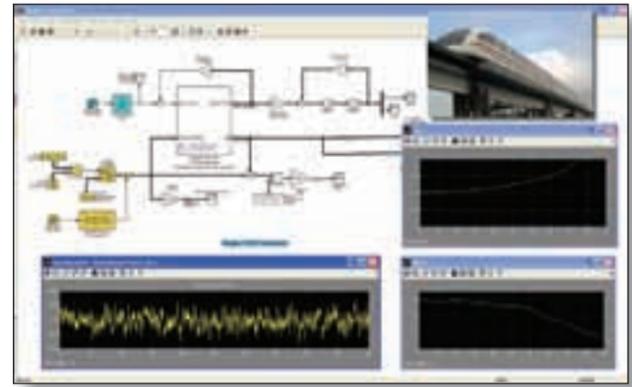
of the vehicle, the team then copied the control systems that came from the Maple analysis into Simulink. The ability to design the control system and develop the model that was exported to Simulink was a critical time-saving step. This process was possible because the Maple analysis flowed seamlessly into Simulink. Furthermore, Maple both documented the analysis and provided the annotations for the Simulink block. The BlockBuilder could then be used to create the system with five degrees

of freedom.

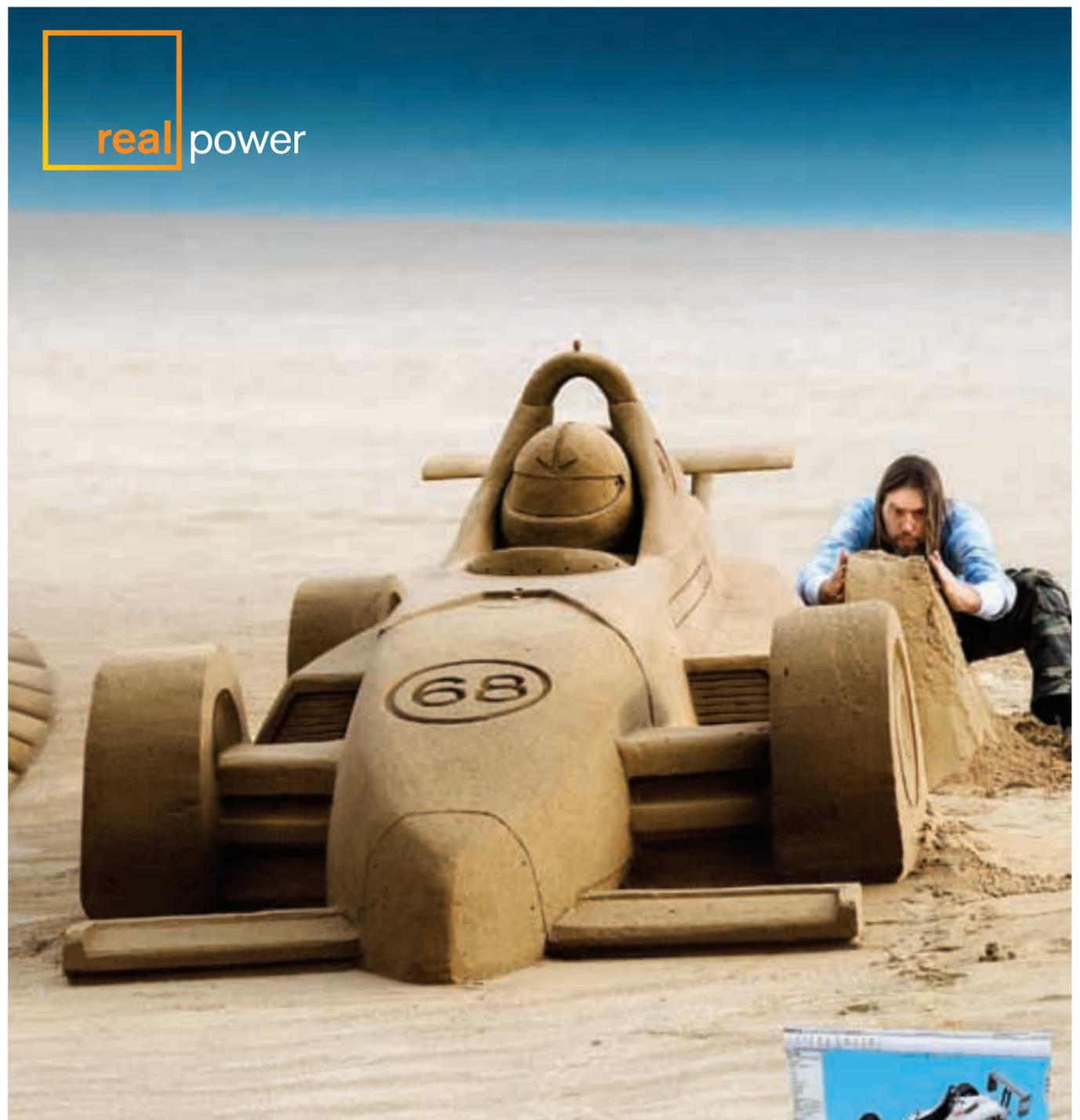
This simulation used three important products – Maple, BlockBuilder and Simulink – to create a complex interdisciplinary model of a system. The combined power helped to drastically reduce development time, at the same time provided the ability to accurately analyze the system, design the components, and produce very complex simulations that can be used to

optimize the design.

This article was contributed by Maplesoft, a division of Waterloo Maple Inc. www.maplesoft.com



Maglev train five-degree-of-freedom (5DOF) simulation includes documenting pitch, yaw and aerodynamic disturbance force.



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Feature: Mechanical CAD

Digital Prototyping: best-in-class production beckons

By Kerry Saumur

The manufacturing sector is caught in a Catch-22 situation. Current market realities dictate that manufacturers create more products, of increasing complexity, all on shrinking budgets. This dilemma is set against a backdrop of heightened customer sensitivity to product quality and a highly competitive playing field.

Forward-thinking manufacturers are taking a fresh look at their business. Starting with design, they are focusing on increasing efficiency in engineering and overall product development through the use of technology. According to "The Digital Product Development Benchmark Report," released in March 2007 by industry research firm

Aberdeen Group, best-in-class companies are embracing Digital Prototyping as a key to increased and efficient productivity. The practice of Digital Prototyping brings together form and function to solve a problem or drive innovation.

Taking a fresh look at your business

The report found that top-performing manufacturers are 22% more likely to use a single digital prototype at each development stage. Fewer prototypes translated to an up to 14-week time-to-market advantage, as well as an estimated savings of US\$7,600 to more than US\$1 million, depending on the product's complexity. Capitalizing on their efficiency and cost-effectiveness, these best-in-class companies met revenue, cost, launch date and

quality targets for more than 90% of their product offerings.

3D computer-aided design (CAD) software alone doesn't account for these impressive results – several other practices pave the way for Digital Prototyping. For example, best-in-class companies opt to work through a 'digital pipeline,' using electronic instead of paper-based communication. Essentially, the digital pipeline allows a free flow of information through all major phases of design and production. Teams have more confidence that they're all on



Marine Advanced Research, Inc. used Autodesk Inventor software to design the first full size Wave Adoptive Modular Vessel prototype. 3D CAD allowed designers to identify and address potential design problems prior to manufacturing.

the same digital page, so to speak, and are working from the most recent version of a particular product design.

Conventional information sharing techniques also often create bottlenecks between the three major phases of the manufacturing process – industrial design or "ideation," engineering and manufacturing. As a result, these phases become individual 'islands' of information in the digital stream. Building that digital pipeline helps connect these islands, which in turn makes Digital Prototyping possible.

The ideation phase traditionally relies on tangible media, and designs are often sketched on paper or molded in clay. For those who create the product's structure and systems, these media are challenging to manipulate. Best-in-class companies often digitize engineering deliverables earlier in the process, thus allowing the information to travel more freely between the 'islands.' The Aberdeen report indicates these top performers are 35% more likely to assess a product's manufacturability prior to design kickoff. This step translates to decreased product costs and fewer changed orders.

The engineering phase faces its own set of challenges. Mechanical and electrical engineers use different tools, which are often incompatible tools with the systems of their colleagues in industrial design and manufacturing. Furthermore, the emphasis on geometry in typical 3D CAD software makes it difficult to capture the performance data that must be represented in a digital prototype so that it can be evaluated using analysis software, before a design is built. That's why many manufacturers have to produce so many physical prototypes, to see how a design will function.

Production teams in the manufacturing phase also benefit when information is captured digitally. At this stage, information in the digital pipeline is further enhanced by data management software tools that make it more accessible. Access to information is useful up and downstream.

Despite its many advantages, Digital Prototyping is still in the process of being fully adopted by all Canadian manufacturers. Beyond 3D CAD, cutting-edge applications built to simulate designs' function are also helping to integrate workflow and link the ideation, engineering and manufacturing phases. Canadian manufacturers can take advantage of these tools to embrace Digital Prototyping and pursue best-in-class status.

Kerry Saumur is National Sales Manager at Autodesk Canada.
www.autodesk.com

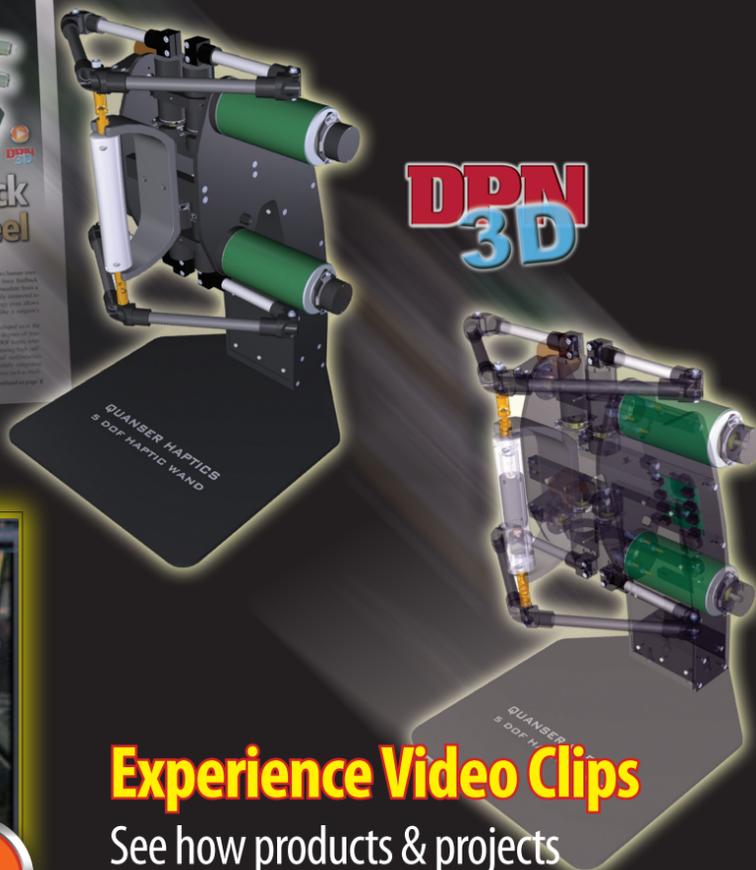
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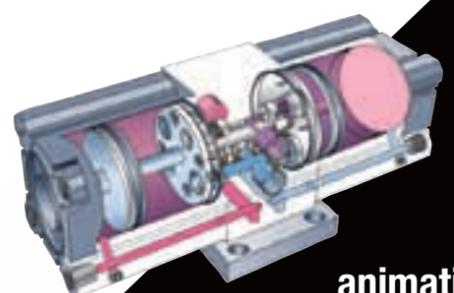
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Technical Literature

Slotted parts. T-Slot Parts Supplement 1 – Expanded Version catalog from 80/20 Inc. offers a full line of products that fit T-slotted aluminum profiles and accessories.
www.tsloparts.com

Linear position transducers. Novotechnik U.S. has published a 64-page catalog that describes linear non-contacting sensors, transducers, signal conditioners and monitors.
www.novotechnik.com

Rod ends. Catalog from Hirschmann Engineering, Heavy-Duty Rod Ends and Spherical Bearings, describes 2 to 50 mm, EN 9100 certified products.
www.hirschmannusa.com

Proportional valves. Introductory CD from Clippard Instrument Laboratory on EVP proportional control valves for air, gas flow.
www.clippard.com/evp-b

Metric small parts. 512-page Hardware catalog from All Metric Small Parts features over 5600 RoHS compliant components, including handles, levers, latches and springs.
www.allmetricssmallparts.com

Motors and drives. The ISA book, *Motors and Drives: A Practical Technology Guide* by David Polka, introduces engineering concepts of motors and drives to both engineers and technicians. A fee applies.
www.isa.org/motorsanddrives

Washers. Boker's, Inc. has announced the 2008 Washer Catalog. Included are more than 22,000 non-standard washer/spacer sizes in over 2000 materials.
www.bokers.com

Couplings. Zero-Max catalog of an expanded line of ServoClass couplings describes 11 sizes in single and double disc models. Operating torques range from 100 to 250 Nm.
www.zero-max.com

Nylon fasteners. Micro Plastics has announced its 270-page catalog #38. Contents include machine screws, cap screws, nuts, washers, spacers and clamps.
www.microplastics.com

CIP Networks. ODVA has announced new editions of the specs for different CIP Networks, which includes updates for EtherNet/IP, DeviceNet, CompoNet and ControlNet.
www.odva.org

Cordset components. 72-page Heyco 2007 edition of its *Cordset Components and Precision Metal Stamping Catalog* provides information about the company's cordset components and metal stamping capabilities.
www.heyco.com

Springs. Lee Spring has published its 2008 Stock and Custom Catalog with over 16,000 stock designs including stainless steel wave springs and constant force springs.
www.leespring.com

Steam jet vacuum systems. The Heat Exchange Institute, Inc. has released the 6th edition of Standards for Steam Jet Vacuum Systems. A fee applies.
www.heatexchange.org

Vibration mounts. Uniload Constant Natural Frequency Mounts, V105, from Advanced Antivibration Components includes mounts that automatically adjust their stiffness in response to load.
www.vibrationmounts.com

CAD Industry Watch

Photomodeler 6 turns photos into models

By Bill Fane

If you design almost anything then you can probably make good use of Photomodeler 6 from Eos Systems (go to photomodeler.com for a free 60-day trial). With this software, you can take a series of photographs of an object or a location and then create and extract 3D models and information from them.

The term “reverse engineering” has a bit of a negative connotation, in that it implies you are stealing someone else's design work. In reality, however, there are a great many situations where reverse engineering is perfectly valid. A couple of examples come to mind. You might have to create a repair part for an old machine whose builder is no longer in existence, or you might have to design a new machine or mechanism that has to fit in the context of and perhaps even connect to existing machines.

Traditionally, this would have involved one or more site visits to painstakingly draw sketches and then take dozens or even hundreds of measurements, only to return to home base to discover that you have missed something.

On the other hand, all you really need is a series of digital photos and a calibrating measurement or two. In fact, it is probable that the sizes subsequently derived from Photomodeler 6 will be more accurate than site measurements.

You can use several different processes to create 3D models using Photomodeler 6.

The first method involves the creation of a series of flat faces. You simply apply points to identifiable locations in the photo to specify a series of lines that outline the flat faces, and then identify the same points in another photo. Photomodeler 6 automatically generates the 3D data from those two sets of points in much the same manner as our two eyes give us stereo vision.

Spare parts may no longer exist

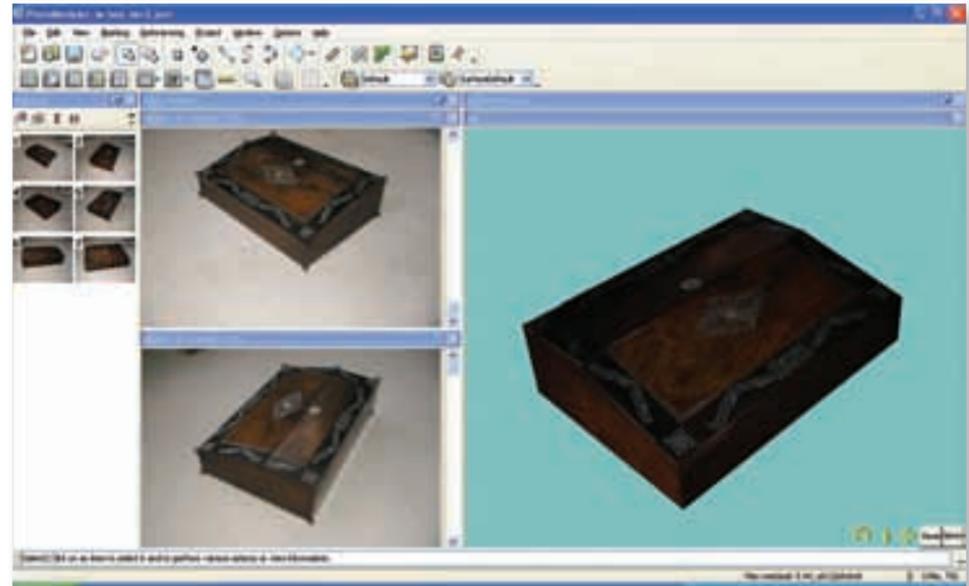
The process can then be repeated for other faces and locations, using additional photos. The only requirements are that the photos must be taken from different camera locations, and that there is enough overlap so that any given point can be identified in two or more photos. The additional photos can be taken from the front, the back, the sides, the top, and the bottom so a full 3D model can be built.

The second method involves pre-defined primitive shapes. This includes such volumes as boxes, cylinders, and cones. Once again, vertex points are identified in two or more photos and Photomodeler 6 does the rest.

Curved surfaces can be defined as surfaces of revolution, and as lofts and blends between curves defined as a series of points, but my favorite is the ‘point cloud’ method.

Using this latter method it is not even necessary for the user to define the points. If the photos include a number of high-contrast circular dots applied to the surface then Photomodeler 6 will scan the photos, find the dots, and generate the blended, curved 3D surface from them. The dots can be applied to the object as stickers, or they can simply be projected as a bunch of dots of light.

A mechanical designer would normally



Photomodeler software can use digital photos from a variety of sources, including scanners and regular digital cameras. The sources can easily be calibrated for improved accuracy.

use any or all of the foregoing methods to document an existing part.

The real magic in any of the methods is that Photomodeler 6 can then take the original photos, generate ortho views from them, and paste them onto the model that was created using any of the described methods. The model can then be rotated and viewed in 3D.

The 3D surface model can also be exported in 13 different standard file formats including IGES, STL, and 2D or 3D .DXF so they can be used by most of the major CAD programs. The ortho bitmaps can also be exported.

The final modeling method involves sim-

ply defining a series of points. In this case, Photomodeler 6 would not create a 3D model, but once we have established a few calibration points and distances then any distance or point location can be determined simply by locating the points in two or more photos. Did you forget to take a critical location dimension off that existing mining machine? Don't worry – you don't need another mid-winter trip to the high arctic to get it. Just lift it from the photos you or someone else took.

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

Low-cost modeling avoids history-based pitfalls

CoCreate (recently acquired by PTC) is another maker of 3D modeling that has entered give-away mode. A free download of the Personal Edition of their OneSpace Modeling software is available at cocreate.com.

So why would you want to download yet another free 3D modeling package, especially if you are already using the commercial version of something else?

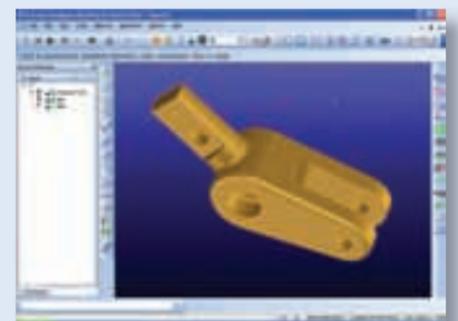
The answer, according to CoCreate, is that their software is different.

Most, if not all, of the parametric modelers out there use the traditional (don't you love the computer industry, where “traditional” means a few years?) history-based modeling process. You create a sketch, dimension and constrain it, extrude or revolve it into a solid, and then move on to repeat the process for additional features until the part is finished. The history of the part is usually displayed feature by feature in a tree structure.

This method works well in many applications, but opponents of it, including CoCreate, claim that a disadvantage of it is the historical tree dependency. If you later decide to edit certain features you can run into serious problems because of these dependencies.

Although they are not the only play-

ers in this part of the game, CoCreate was one of the first software companies to introduce no-history modeling, which



OneSpace from CoCreate employs a no-history modeling technique, which breaks traditional history tree dependencies.

they call “Dynamic Modeling.” With it, they claim to have broken the dependency with the usual history tree. This means that significant design changes can be made much later in the design process with far fewer complications.

Another advantage to this approach comes when you need to collaborate with people who are using a different brand of software. It does not need the history tree from the other software, and so it is able to edit what is usually a “dumb” one-piece STEP or IGES file from the other systems.

The bottom line is that neither history-based nor non-history-based systems are perfect for every application.

Feature: Mechanical CAD

Latest CAD/CAM technologies streamline transition from design to manufacturing

By Rainer Gawlick

Manufacturers used to have more flexibility to accommodate iterations between design and manufacturing: time and cost demands were less pressing, and design and manufacturing personnel were often co-located, making collaboration more efficient. Today, however, the need to accelerate time-to-market and squeeze costs out of product development, combined with greater levels of geographically removed or offshore manufacturing, has created additional challenges for spotting and addressing production issues upfront.

Fortunately, new capabilities that assess design for manufacturability/design for assembly (DFM/DFA) features in 3D CAD software can help engineers address manufacturing and assembly issues as part of design, preventing delays and cost overruns during production.

Manufacturing methods predominantly fall within three categories: forming, fabricating, and machining. Each process has its own characteristic production issues, and a range of 3D CAD technologies have emerged to assess DFM for each method.

Forming processes use a tool – a mold, a pattern or a die – to create the part and include injection-molding, casting, forging and stamping. Although each of these methods uses different materials and techniques, a common requirement is the need to provide sufficient draft: the minimum taper or angle given to a mold, pattern, or die to ensure the part will pull away easily and blemish-free. Instead of leaving decisions about draft and parting lines to the toolmaker, designers can now use CAD draft and parting line analysis capabilities to ensure proper extraction of the part, while still meeting the functional and aesthetic requirements of the design. Tools are also available for identifying costly undercut features that require sliders or side

action, as well as for maintaining uniform wall thicknesses to prevent sink spots.

For fabrication, designers can use 3D CAD capabilities to create sheet-metal parts in both flat and bent states; first designing the bent state then automatically creating flat patterns based on bend table and K-factor information for different material types. Designers can export flat patterns directly into laser and water-jet cutting machines for cutting the flat patterns. This eliminates the time-consuming, expensive and often error-prone step of manually converting the bent sheet-metal design into a flat pattern for manufacturing.

When machining parts – whether milling, turning or drilling – designers can use new 3D CAD capabilities to assess the manufacturability of specific features. These tools help designers check for features that would be impossible or very expensive to machine, such as rounding the outside edge of a machined part to break the edge when a chamfer would be less expensive, or creating a bolt clearance hole that does not match an available machine shop drill size.

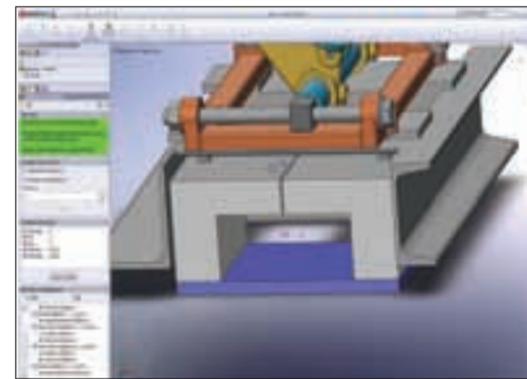
3D CAD tools can also save time and reduce errors by automatically applying industry-standard dimensioning and tolerancing schemes. Failing to define tolerances and dimensions appropriately can add costs by leaving too much to interpretation in the production of parts.

Drawings with appropriately dimensioned and toleranced parts apprise machinists of the critical dimensions and tolerances they must abide by when manufacturing parts. Tolerance stack-up analysis capabilities help engineers evaluate dimensioning and tolerancing schemes to ensure that assemblies will fit together and function properly.

Design for Assembly (DFA) relates to both assembly and disassembly. In both instances, the visual nature of 3D CAD can help designers to pinpoint assembly and clearance issues upfront. For example, inter-

ference detection tools allow engineers to identify and resolve part collisions within an assembly during design. Likewise, the ability to virtually disassemble and reassemble parts in a 3D CAD system enables engineers to address clearance needs, such as providing enough room to tighten or loosen a screw, access and change a filter, or make sure components fit.

Perhaps the greatest challenge that product developers face today in developing successful products is generating designs that are as close to the final, manufacturable state as possible. New DFM/DFA CAD capabilities can provide the tools designers need to achieve this



With the SolidWorks TolAnalyst, engineers can output worst-case maximum and minimum tolerances and clearly identify which tolerances affect the stack-up the most. Below: Solidworks DFMExpress.

Tolerances and dimensioning are becoming automated

goal by addressing manufacturing issues. Rainer Gawlick is VP, Worldwide Marketing, SolidWorks Corp. www.solidworks.com

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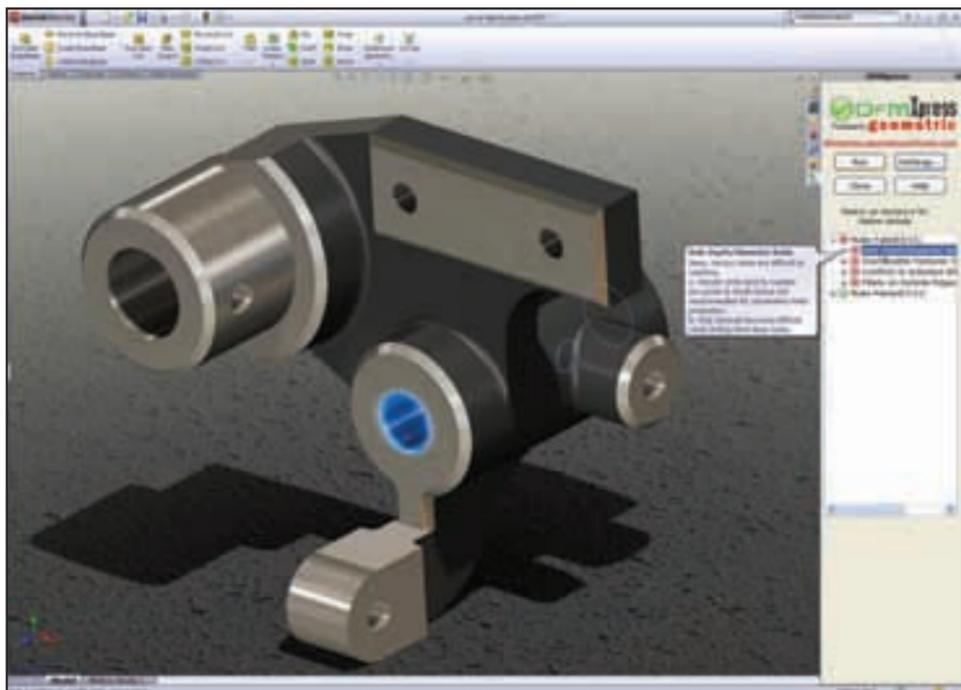
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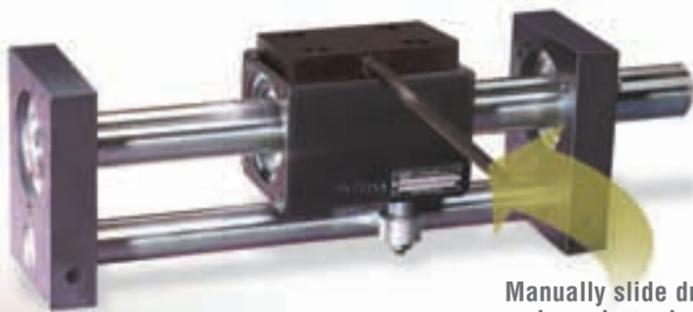
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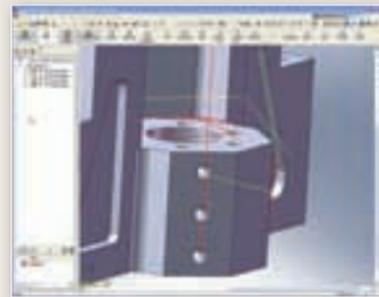
CAD Chronicle

SMB document management

Siemens PLM Software has announced Version 3 of Teamcenter Express collaborative product data management software includes integration with Microsoft Office 2007 applications and improved view and markup capabilities in the web client. The new capabilities are said to enable more complete design-through-manufacturing data management for small- to mid-size manufacturers (SMBs) through expanded integration with the user's desktop. www.siemens.com/plm/teamcenterexpress



hyperMILL integration for SolidWorks users



With the product release of hyperMILL V9.7, Open Mind Technologies AG is now offering SolidWorks users an integrated solution for the very first time. The CAM software is also integrated with Pro/ENGINEER Wildfire, Autodesk Inventor, thinkdesign and hyperCAD 2007. Both CAD and CAM systems access the same pool of data. A uniform data model is used during the entire process to ensure the accuracy and transparency of the manufacturing process and to prevent errors. www.openmind-tech.com

Handheld 3D laser scanners



Creaform has announced the EXAscan, a self-positioning handheld laser scanner equipped with a third high definition camera, located in the upper central section, to increase the scanning resolution as well as the data acquisition accuracy. The portable 3D scanner also has a new automatic multi-resolution function, enabling it to automatically set the optimum resolution level of the data acquired, according to the type of surface it is scanning. Units are based on the same technology found in the company's Handyscan 3D laser scanner. www.creaform3d.com

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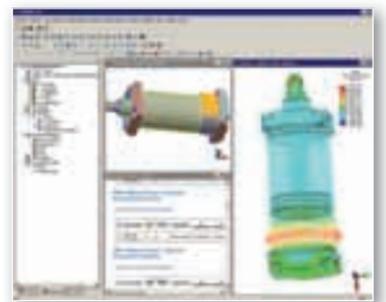
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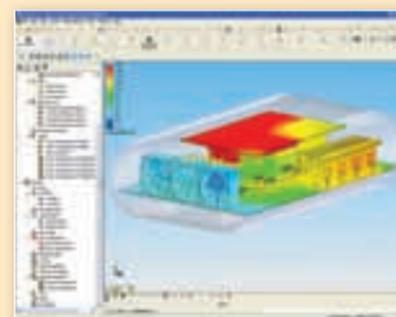
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Finite element analysis

Algor, Inc. has announced that its latest FEA software release, Algor V21, upgrades modeling, solution and results evaluation, and presentation. Features include a behind-the-scenes representation of the CAD model and meshing algorithms for better mesh matching and automatic contact in complex assemblies; calculation of mass transfer due to diffusion in 3D transient analysis; 3D display of 2D axisymmetric and planar model results (using rotation or thickness values); and enhanced reporting capabilities. www.algor.com

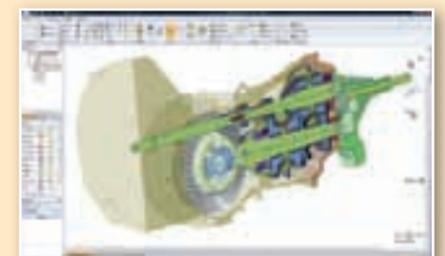


Engineering fluid dynamics



Flomerics has released Version 8.1 of its Engineering Fluid Dynamics (EFD) simulation software for thermal analysis of electronics. Functionality includes simulation of "Joule heating," as well as "compact" models for IC components, heat pipes and thermoelectric coolers. The treatment of thermal conductivity in PCBs has been improved and the simulation of fans has also been improved with radial and swirl components of velocity. www.flomerics.com

CAD-neutral design



SpaceClaim Corp. has announced SpaceClaim Professional 2007+ 3D design software said to help more quickly originate concepts, make better use of existing models and freely modify mechanical designs. The release includes the ability to create sheet metal parts, as well as open and modify sheet metal parts originating in other CAD systems. Designers can also work with lightweight assemblies, drive 3D modifications via any 2D section, and integrate with CAD-neutral partner applications. www.spaceclaim.com

Traveling 12,665 miles per gallon.

To win the Shell Eco-Marathon race for fuel efficiency, the team of the Swiss Federal Institute for Technology and Tribecraft AG had to start with a clean slate to design, develop and implement a totally new vehicle. A vehicle that eventually achieved the equivalent of 12,665 miles a gallon!

Product lifecycle management (PLM) solutions from Siemens PLM Software were key to program success. Solutions included NX® software for product design and Teamcenter® software for data management.

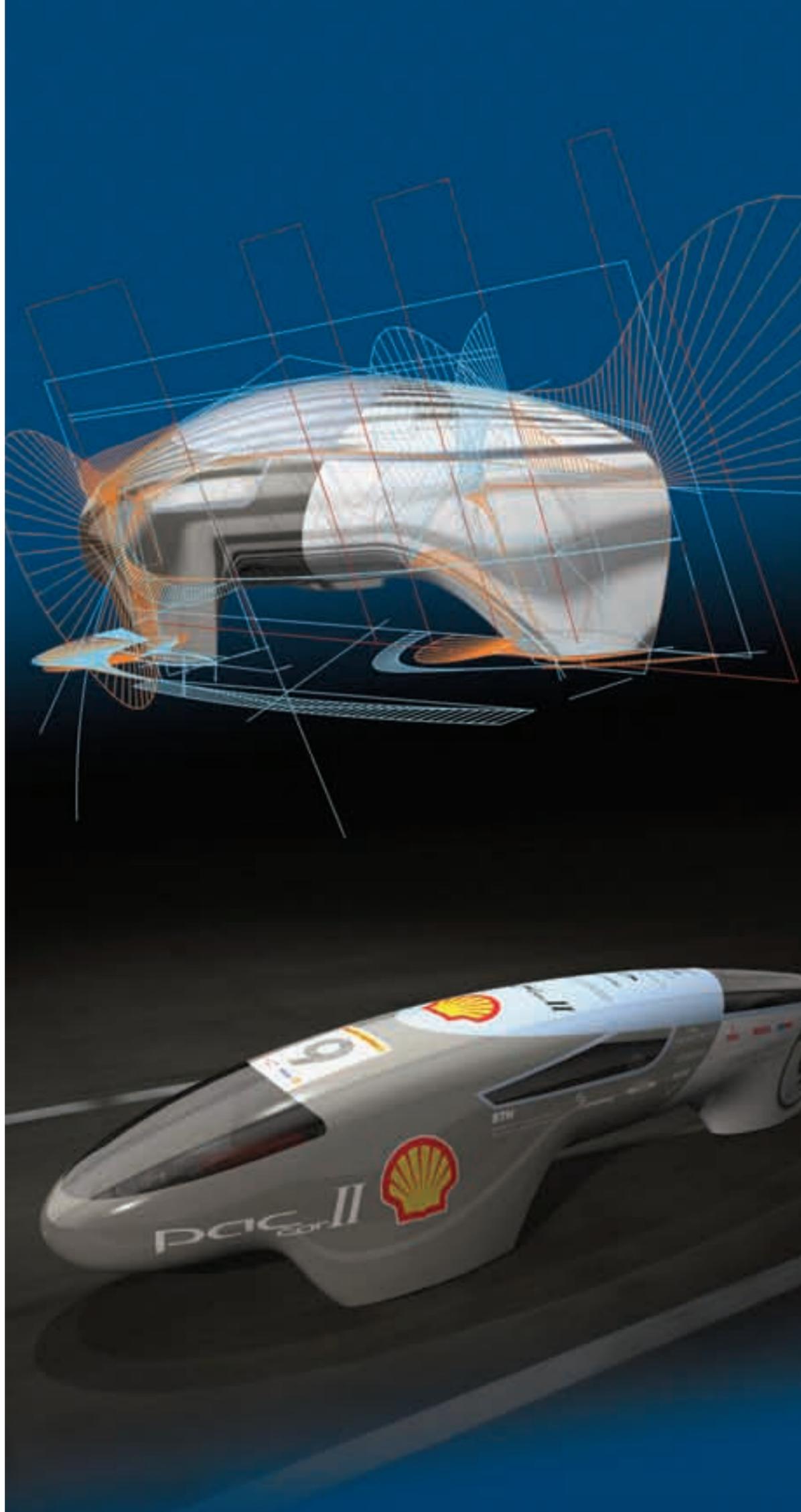
The NX Master Model software approach streamlined the process and gave the team needed time to explore design alternatives and answer conceptual questions. NX WAVE technology ensured system-level control throughout multiple design changes to subsystems.

While the most critical challenge was shaping the vehicle body for fuel efficiency, visual appeal was also a high priority for the design team. Ultimately, NX's powerful surfacing tools helped the PAC-car II slip through the air with an incredibly low coefficient of friction and still embody visually striking aesthetics in a hydrogen-powered vehicle.

See the full Tribecraft story at www.siemens.com/plm/assessment.



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Automotive Scene

The quest for fuel economy through weight reduction

By Bill Vance

The search for improved vehicle fuel economy driven by high oil prices and environmental concerns is pushing the frontiers of engine technology, driveline efficiency and aerodynamics. Another area receiving increased attention is weight reduction, with the challenge of balancing the need for passenger safety with lower mass.

With added features such as ABS, air conditioning, GPS, automatic transmissions, electronic stability control and sophisticated sound systems, the mass increases. Also, while cars are becoming more fuel efficient, the growing proportion of SUVs and pickups in the fleet has contributed to a steady climb in average vehicle weight over the last decade.

More powerful engines have retained performance, but for better economy, reduced weight is a must through lighter, better engineered materials.

Aluminum is a proven weight saver, and the fastest growing alternative to steel. By replacing the iron cylinder liners with aluminum in the 2007 Acura

MDX's 300 horsepower 3.7 litre V6, Honda saved 2.7 kg, contributing to an overall 7.8 kg reduction over the previous 3.6 litre, 265 horsepower V6. The aluminum-magnesium engine block in the new BMW 3-Series saves about 12 kg, providing better vehicle weight distribution.

General Motors is counteracting the extra weight of the battery pack, motor-generator and two-mode transmission in its 2009 hybrid Chevrolet Silverado and GMC Sierra full-size pickups with aluminum bumpers, driveshaft, tailgate and seat frames. The aluminum space frame in the Chevrolet Corvette saves 62 kg. Audi's A8 luxury model has an aluminum spaceframe, and Jaguar uses it for the entire XJ bodyshell.

Magnesium is lighter than aluminum and even more expensive, so its application is still limited. Ford uses it for the radiator support of its F150 pickup, and Chrysler in its minivan third row "stow-and-go" seats and Jeep Wrangler spare tire bracket. Magnesium and aluminum are often combined as an alloy.

Steelmakers are countering with the development of new high strength steel (HSS) that's stronger than regular mild steel,

Plastics, aluminum, magnesium and advanced steels



Jaguar uses aluminum for its entire spaceframe construction. Steel composites, plastics and carbon fibre materials are also making inroads in the automotive industry when it comes to overall vehicle weight reduction.

allowing thinner gauges for weight saving. More than half the current steel grades available evolved within the last 10 years.

An evolution of HSS is Advanced High Strength Steel (AHSS), which is more ductile to facilitate forming. Since 1975, automakers have increased the amount of HSA per vehicle by 134 kg.

Ford used about 40% HSS in its Five Hundred (now Taurus) model body structure. The Volvo V70's safety cage is HSS/HSSA, and it makes up 60% of Saab's 9-3 SportCombi station wagon body. The bodies of the Honda Civic and Acura MCX are 50% and 56% HSS respectively.

In addition, plastics now comprise some 50% of vehicle interiors. The average vehicle has approximately 113 kg of plastic, and

it is finding increased application in such areas as body panels, intake manifolds and fuel tanks. But engineers must always be cautious of a thermal expansion and contraction rate that is higher than steel's.

The liftgate of the Buick Rendezvous crossover vehicle is plastic, as are the fenders of GM's Hummer. BMW uses plastic for the front fenders and trunk lid of its 6-Series cars, and the grille of the Volkswagen Passat and rear spoiler of the Rabbit-based GTI are plastic.

Finally, exotic and expensive carbon fibre, a staple in race car construction, is also creeping into production cars.

Bill Vance is an automotive journalist and author. His books are available at billvanceautohistory.ca.

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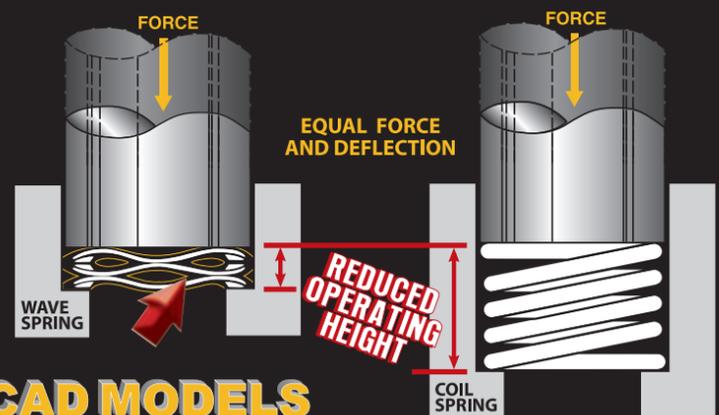
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Feature: Motion Control

Integrated drive and motor units: doing "more with less"

In the world of factory automation, "doing more with less" is a fundamental, ongoing goal that's led a major development in drive technology: the introduction and growing use of integrated drive/motor combinations.

With integrated servo drive/motor technology, the drive electronics are relocated from the control cabinet and mounted directly on the motor at the machine. It conserves space, reduces equipment components and cabling, and offers a modular, more efficient drive solution.

For example, the Bosch Rexroth IndraDrive Mi is an extremely compact drive and motor combination that uses 50% less space than comparable conventional servo solutions, and up to 30% less space compared to other integrated solu-

den of controlling an individual axis of movement from a centralized control (PLC or industrial PC) out to the drive, allowing the OEM to add scalable processing power.

Thanks to advances in microelectronics, intelligence can be distributed throughout a machine – to the sensors, motors, drives and other components. Integrated drive/motor technology leverages the processing power that can be built into the drive with today's low cost processors and memory.

Combined drive/motor units offer OEMs the opportunity to implement new cabling architectures between the control cabinet and the drives. Since the drive is no longer located in the cabinet, there is no need to run separate power and control cables from each

motor back to the cabinet.

Suppliers have adopted several cabling approaches – some are more efficient than others. One approach still uses separate power and control cables; a second approach combines drive power and communications into a single cable.

A third approach shown in Rexroth's IndraDrive Mi provides a separate, efficient cabling solution: A single cable carries both power and SERCOS communications. Up to 20 units can be "daisy-chained" off a single power supply, dramatically reducing cabling and the associated installation and mainte-



With integrated servo drive/motor technology the drive electronics are mounted directly on the motor. Inset: Units can be daisy-chained off a single power supply, dramatically reducing the cabling and associated installation costs.

nance costs – a simpler solution that maximizes the design advantages of distributed architecture.

This article was contributed by Bosch Rexroth Canada Corp.
www.boschrexroth.ca

Integrated systems simplify design, commissioning

tions. It demonstrates the value of leveraging advanced materials and electronics to combine more functionality into smaller, simpler units.

Conventional servo drives place the power units and drive control in a separate cabinet outside the machine enclosure. Cabling runs from the cabinet and connects the control unit to the motor, with one power unit cable and one control unit cable per motor.

Advances in current-day drive electronics, which are smaller and more rugged, have helped make integrated drive/motor units practical for locating outside of the control cabinet. This helps reduce cabinet size and leads to a reduction in components such as cabling, distribution boxes, and cabinet cooling devices.

Plus, integrating the drive control and motor into one package creates a more flexible "plug and play" capability. Additional machine axes can be added with minimal set up at the main controller, since the drive control functionality is resident in the combination unit.

Several factors have contributed to the development of integrated drive/motor technology. The first has been the widespread transition from mechanically-driven production lines to electronic line shafting.

Complicated, maintenance-heavy gears, pulleys, and other mechanical components have been replaced in many applications with electronically synchronized servo motors for systems like wrappers, pouchers, cartoners and so forth. Electronic line shafting helps deliver more accurate and flexible machine control, less downtime, lower maintenance costs, and the opportunity to reduce machine footprint.

Machine builders, however, continue to face pressure for cost and space savings. The control cabinet required to house power and drive units is an additional factor that can eat up limited floorspace and cost, particularly in applications where an existing machine is being retrofitted with servos.

Many OEMs and factory operators have also embraced the application of distributed intelligence in factory automation. This approach to motion control moves the bur-

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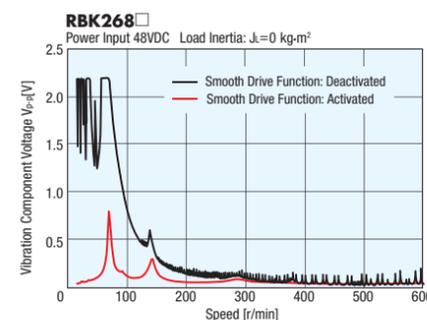
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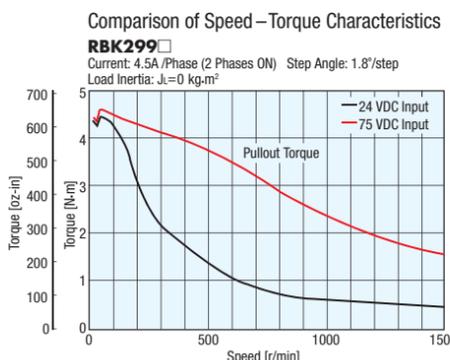
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The Smooth Drive Function is a function that automatically controls the motor's microstep drive operation at the same travel and speed as in the full-step mode, without the operator having to change the speed settings of the driver's pulse input. It enables low-vibration operation available with the microstepping drive to be achieved with the flick of a switch.



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Feature: Motion Control

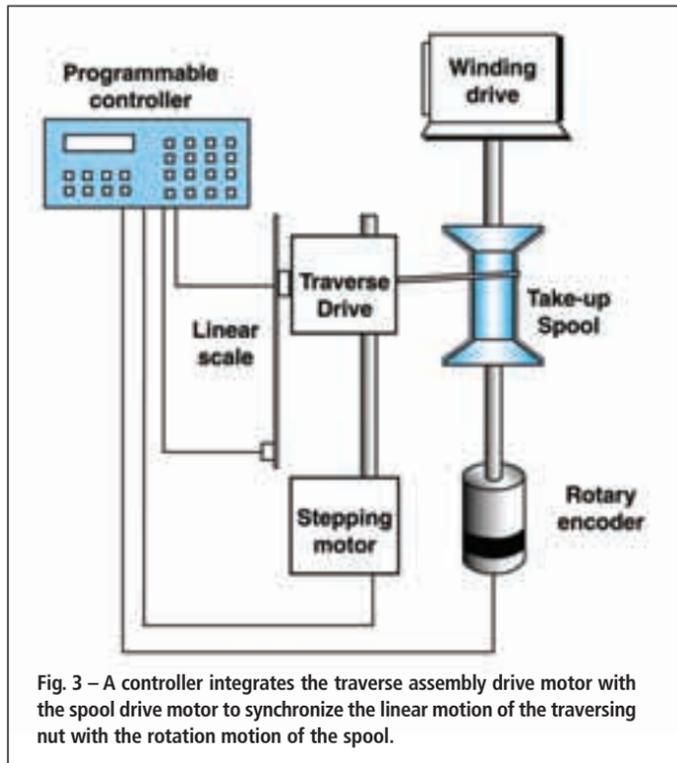


Fig. 3 – A controller integrates the traverse assembly drive motor with the spool drive motor to synchronize the linear motion of the traversing nut with the rotation motion of the spool.

Linear motion in winding

The traversing assembly in winding machines or take-up systems is the component which moves the material being spooled back and forth across the spool/reel core (fig. 1). The traversing assembly usually includes a nut or block which holds a guide or roller for the wire, rope or other material (fig. 2). To achieve a finished spool with smooth, evenly spaced rows of material, it is necessary to synchronize the linear motion of the traversing nut with the rotation of the take up spool.

For example, suppose the application is level winding of wire that is 0.375 in. thick. For a level wind, the traversing nut must travel in a linear direction 0.375 in. per one spool revolution. This assures that each row of wire is correctly spaced across the spool core from one spool flange to the opposite flange. If the nut moves less than 0.375 in., the material will overlap; if more than 0.375 in. then the material will have spaces between the rows.

The linear distance traveled by the traversing nut – 0.375 in. in the example above – is referred to as the linear pitch of the nut. Screw-based traversing assemblies use electronic controls to synchronize pitch with spool rotation (fig. 3). Mechanical traversing



Fig. 1 – Traverse assembly on winding machine.

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assemblies do not require an electronic control system (fig. 4). However, whereas the electronically controlled systems offer essentially unlimited pitch adjustment capability, the mechanical methods do not. In a mechanical system the pitch adjustment is either fixed or it is adjust-



Fig. 2 – Wire guide mounted on top of traversing nut.

able but within a limited range.

There is a way to modify the pitch range in mechanical traversing devices in order to expand the range of application. Looking again at fig. 4, the traversing nut shaft is driven via a belt to the spool shaft. The pitch of the nut is set by moving the pitch control lever (Fig. 5). In mechanical systems like this, regardless of spool shaft rotational speed, the traversing nut

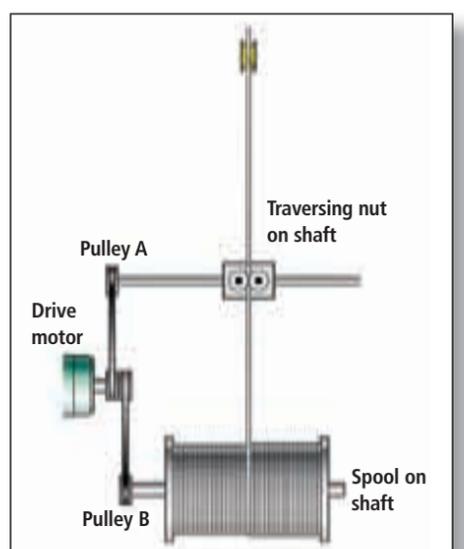


Fig. 4 – A mechanical system does require a controller or electronics.

systems

will always travel the same linear distance (pitch) per shaft revolution.

The pitch control lever affords a 10:1 pitch turndown capability. If the thickest material being spooled is 0.500 in., this system will accommodate material as thin as 0.050 in. using just the pitch control lever. This assumes the pulley wheel A and B are of equal size.

What if the operator needs to set a pitch that is outside of the 10:1 range? In

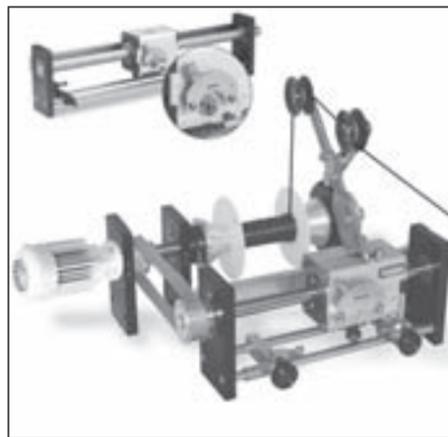


Fig. 5 – The pitch of the nut is set by moving the pitch control level (top). A winding system (bottom) based on a mechanical traversing assembly requires no electronic controls or programming.

an electronically controlled system this is a simple matter of adjusting controls. In a mechanical system (fig. 5, bottom), this is accomplished by varying the size ratios of pulley wheels A and B.

If the size of pulley wheel A increased relative to wheel B, the traversing nut shaft will turn slower, and vice versa. Therefore – even though the nut still moves the same linear distance per shaft revolution – it will do so at a slower or faster rate of speed depending on the size ratio of the pulley wheels. This effectively enables the operator to meet different pitch requirements without having to resort to an electronic control system.

This article was contributed by Amacoil Inc. www.amacoil.com

Products: Motion Control

Brushless ac servo motors



Baldor has announced a range of ultra-compact brushless ac servo motors. Capable of delivering peak torques of up to 3.8 Nm, combined with other interesting dynamic performance attributes of servo motors such as fast acceleration, the BSM R-series motors are packaged in 40 and 60 mm square bodies. Construction features employed in the motors mean that their action is said to be virtually “cog free” at slow speeds. Continuous stall torque ratings span 0.16 to 1.27 Nm, and peak torques range from 0.48 to 3.8 Nm. Users can also specify motors with a resolver or 2000 ppr encoder fitted for positional feedback or add a 24 Vdc brake.

www.baldor.com

Ultraminiature ball screws



Steinmeyer, Inc. has announced a line of ultraminiature ball screws available in 400 series stainless steel with diameters

as small as 3 mm with choice of two pitches – 1 or 0.5 mm. The company now offers a range of miniature screws in stainless steel from 16 mm diameter (with up to 30 mm pitch). The screws are equipped with one of four types of ball nuts, with or without preload.

www.steinmeyer.com

Speed controller for motors



The DECS 50/5 (Digital EC Controller Sensorless) from Maxon Precision Motors is a controller for driving brushless dc motors without Hall sensors. The input voltage range of the business card-sized unit is 10 to 50 V. In continuous operation, an output current of 5 A of the power stage is permissible, giving it a maximum output performance of 250 W. The speed value (80,000 rpm maximum) can be set via an integrated potentiometer or an analog set value. The unit also provides control inputs for selecting motor direction, enable and braking.

www.maxonmotorusa.com

Linear magnetic encoders

LM10 linear magnetic encoders from Renishaw provide 100 m travel capability. The solid-state, non-contact design features an IP68 readhead that rides at 0.1 to 1.5 mm standoff over a self-adhesive magnetic strip scale, providing the count for positioning at 5 µm resolution at 20 m/s and 1 µm at 4 m/s. An adhesive-backed magnetic scale is available either “cut to length” or in lengths of up to 100



m in coils. The linear encoders come in digital or analog output models and offer customer-selectable resolutions including 1, 5, 10, 50 and 100 µm and user-selectable reference mark position.

www.renishaw.com/encoders

Synchronous motors



Superior Electric and Pacific Scientific synchronous motors from Vickers-Warnick are high pole count motors that naturally turn at slower speeds (72 or 60 rpm at 60 and 50 Hz, respectively). Units are said to only need a resistor capacitor (RC) network to operate from single-phase ac utility power. For loads that operate at 72 rpm or slower, they are also said to be very cost effective and simple to use. Torques range from 50 to 1,060 Ncm and gear reducers with ratios up to 125:1 provide torques up to 3,670 Ncm.

www.vickers-warnick.com

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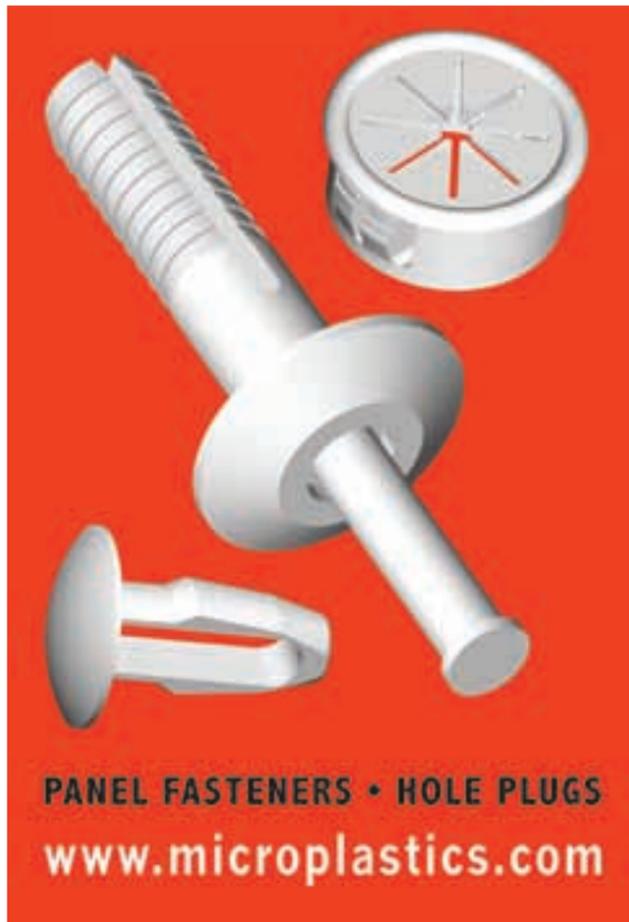
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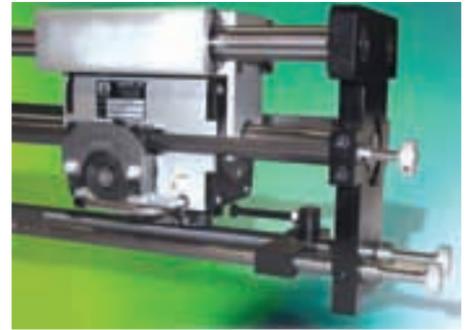


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Motion Control

Linear drive pitch control



Uhing “rolling ring” linear drives from Amacoil now feature a mechanical pitch adjustment lever enabling a variable pitch drive system without requiring gear changes or adjustment of other controls. Users adjust pitch by moving the selector lever along a notched scale. If a more precise pitch adjustment is required, a worm gear and threaded rod design bypasses the notched-scale settings. Users turn a control knob on the end of the threaded rod which permits fine tuning of linear pitch on-the-fly without stopping the drive system.

www.amacoil.com

Motion for packaging



Rexroth IndraMotion from Bosch Rexroth Canada is said to offer full motion logic integration on one hardware platform. Pre-configured technological functions such as for packaging provide adequate room for specific implementation as well as simultaneously guaranteeing optimal know-how protection, the company says. The scalable system, covering both hardware and software, is available in three versions (depending on the number of motion axes required), with the intelligent IndraDrive drive generation conveying certified safety functions direct to the spot where motion takes place.

www.boschrexroth.ca

Stepper controller/driver



Nyden Corp. has introduced the multi-phase (2- and 4-phase) ICD200 stepper controller/driver series. The standalone system is designed to execute trapezoidal and S-curve shape (memory data) acceleration/deceleration motion profiles. It offers designers three types of operation modes: Sensor Mode, Absolute Position Mode and Relative Position Mode. The 60 x 90 x 36 mm unit provides a maximum microstepping resolution of 20,000 steps/rev. The programmable series is daisy-chainable up to 15 devices using the RS485 communication protocol.

www.nyden.com

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Medical Engineering

Infant emergency transport made secure

By Mark Sunderland

Typically, the patient who is traveling to hospital in an ambulance is strapped on a gurney and enters head first through the back door. Unlike stabilizing cargo on a flatbed, securing a patient on a gurney is a much more delicate process and to do so in a manner that does not exacerbate an existing wound and risk further injury during transportation is a process that requires both skill and specialized equipment.

This is especially true in the case of infants and newborn babies, many of whom are not very good at remaining still. With a restraint system the attending paramedic must have easy access to the patient so that any part of the harness can be quickly unbuckled and opened.

ParAid Medical of Birmingham, UK, has designed and manufactured an Ambulance Child Restraint (ACR) system. The ACR is an innovative flexible system of fully adjustable webbing belts that are held in place with Velcro for the safe and effective transportation of younger patients from newborns to around 12 years old.

ParAid teamed with award-winning, Glasgow, UK-based Lightweight Medical (lightweight-medical.co.uk/) to launch two entirely new products for the safe transportation of critically ill newborns namely, the "neo-restraint" and "neo-capsul."

Until now, there has been no safety-conscious method available for either ground or air transportation for critically ill newborn babies.

ParAid's neo-restraint is based on carbon fibre restraint bars, a washable foam mattress and six dual density foam wedges which can be configured in any position along the bars. Cotton straps, secured with hook and loop, pass over each pair of foam wedges resulting in a soft, yet rigid structure that reduces the potentially harmful effects of vibration and can restrain a 500 g to 5 kg baby safely and comfortably.



Above: The neo-capsul incorporates an aluminum space frame. Right: The neo-restraint integrates military grade Velcro.

The harnesses are available in three sizes and selected according to the size and weight of the child. An integral net bag in the mattress cover enables all components to be washed together after use and the kits are color-coded for easy identification. The military grade Velcro attachments withstand multiple wash cycles and maintain their function much longer than conventional Velcro.

The neo-capsul has an aluminum space frame which encases the neo-restraint in a double-skinned clear acrylic module that allows medical teams visibility and easy access to the infant for monitoring and treatment during the journey. The internal shape provides stability, and the double-skinning enables sound levels and vibration in the module to be reduced significantly, decreasing the potential distress of the baby within.

ParAid began working with Lightweight Medical on the project about two years ago and ParAid's managing director Barry Scholes says the relationship has been very rewarding throughout.

"Working with an external research

and development team is extremely beneficial as it means we can concentrate on running the business knowing that the project is in safe hands," said Scholes.

"Lightweight Medical's communication skills are a major strength. The team is very commercially minded and keeps us in touch with each step of design development, consulting regularly with us on fabrication issues. Because of this close consultative approach there have been very few modifications as we move into production."

The potential benefits for the ACR system are substantial for paramedics, any hospital with a neonatal intensive care unit and, above all, the child.

Further information about ACR systems in Canada can be obtained from info@biomedgroup.com.

Mark Sunderland is President, BioMedical Industry Group, Ottawa (mark@biomedgroup.com).

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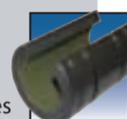
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www.ntn.ca



Right angle speed reducers

An expanded series of 41 miniature inch and metric right angle speed reducers introduced by Stock Drive Products are designed to operate in any output direction: reverse, same or dual. Units are suitable for connecting accessory instruments, for reversing rotation of flexible shafts and for controlling two units through one power source. The 113 g units come with twin hex nuts.

www.sdp-si.com



Nickel-plated motors

Eaton Corp. has added a selection of factory nickel-plated models to its spool valve motors line. The motors distribute fluid into and out of the Gerotor (H Series) or Geroler (S and T Series) orbit gear-set through valve slots machined into the output shaft. The design combines valving and hydrodynamic journal bearings into a common shaft design. The motors are said to provide high torque at low speeds.

www.hydraulics.eaton.com



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Misumi USA offers round, square and compact flange style, single or double linear ball bushings for a variety of industrial applications. The products are available in 52100 bearing steel (with or without electroless nickel plated surface) or 440C stainless steel cylinder and ball construction, with resin or stainless steel retainers, Nitrile rubber seals and accept shaft diameters from 6 to 50 mm.

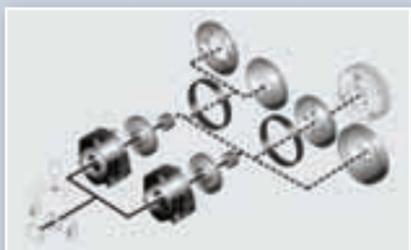
www.misumiusa.com



Miniature ball bearings

SPB-USA has introduced what it says are the world's smallest ball bearings under the EZO-SPB brand name. Each bearing has an inside shaft diameter of 0.06 mm and outside diameter of 2.5 mm and a width of 1.0 mm. Each ball, and there are 5 in each race, is smaller than those found in a ball point pen and each is ground to ensure long life at operating speeds of between 142,000 and 160,000 rpm.

www.spb-usa.com



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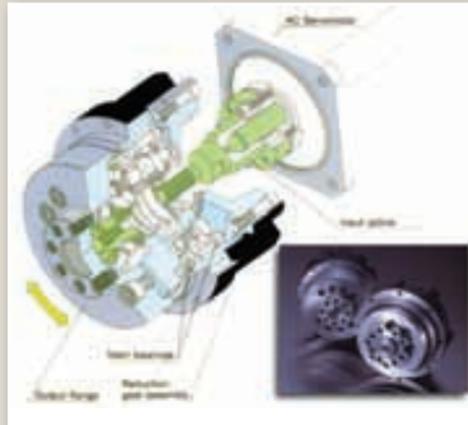
Lenze-AC Tech has announced a spring-applied brake. When properly applied, the model BFK458-L is guaranteed for 10,000,000 cycles or two years of service life. The brakes are released by applying dc voltage to an EM coil. Constructed of a cast iron casing, there are 4 sizes in the range, with rated torques from 4 to 46 Nm; shaft sizes from 10 to 25 mm and brake coils can be supplied for 24 V low voltage or rectified 103, 180 and 250 Vac.

www.actech.com

Cycloidal gearbox

Nabtesco gear boxes consist of a patented 2-stage cycloidal design said to provide better performance when compared to traditional planetary reducers and other geared positioning devices. The gear boxes are also said to not only provide large torque, high ratios and near zero backlash, but also incorporate a set of large, internal angular support bearings that provide large moment capacities.

www.vickers-warnick.com



Bearing replaces 4 components

Bearing manufacturer NKE Austria has developed a special bearing unit for a cutter tine rotor of a power harrow for an agricultural machinery manufacturer. The new bearing unit replaces four separate components and is based on a standard deep groove ball bearing 6212, with the resulting bearing features an RS synthetic rubber seal on one side, a radial oil seal between the outer and inner races as well as a felt seal with a metal cap on the other.

www.globalbear.ca

Hybrid stepper motors

MAE brand HY Series hybrid stepper motors from Ametek Technical & Industrial Products are said to exhibit low rotor inertia to promote maximum possible acceleration. The motors are offered in four standard NEMA frame sizes with step resolutions of 1.8° in full-step mode. Motor lengths range from 0.81 to 8.89 in. and holding torques from 12 to 2018 oz in. can be achieved, depending on model. Size 17 motors additionally are available in three lengths and can achieve holding torques from 37 to 71 oz in., depending on model.

www.ametektechnicalproducts.com



Servos eliminate gear box

Beckhoff Automation has introduced AM3500 series servo motors said to eliminate a gear box in high inertia applications such as rotary tables. The models are available with flange sizes 3 to 6, torques between 1.9 and 15 Nm and rated speeds of 3000 and 6000 rpm. Resolvers or absolute encoders (single- or multi-turn) are available as a feedback system. The standard protection class is IP 64 with IP 65/67 available as an option. This motor series is CE-, UL- and CSA-listed.

www.beckhoffautomation.com



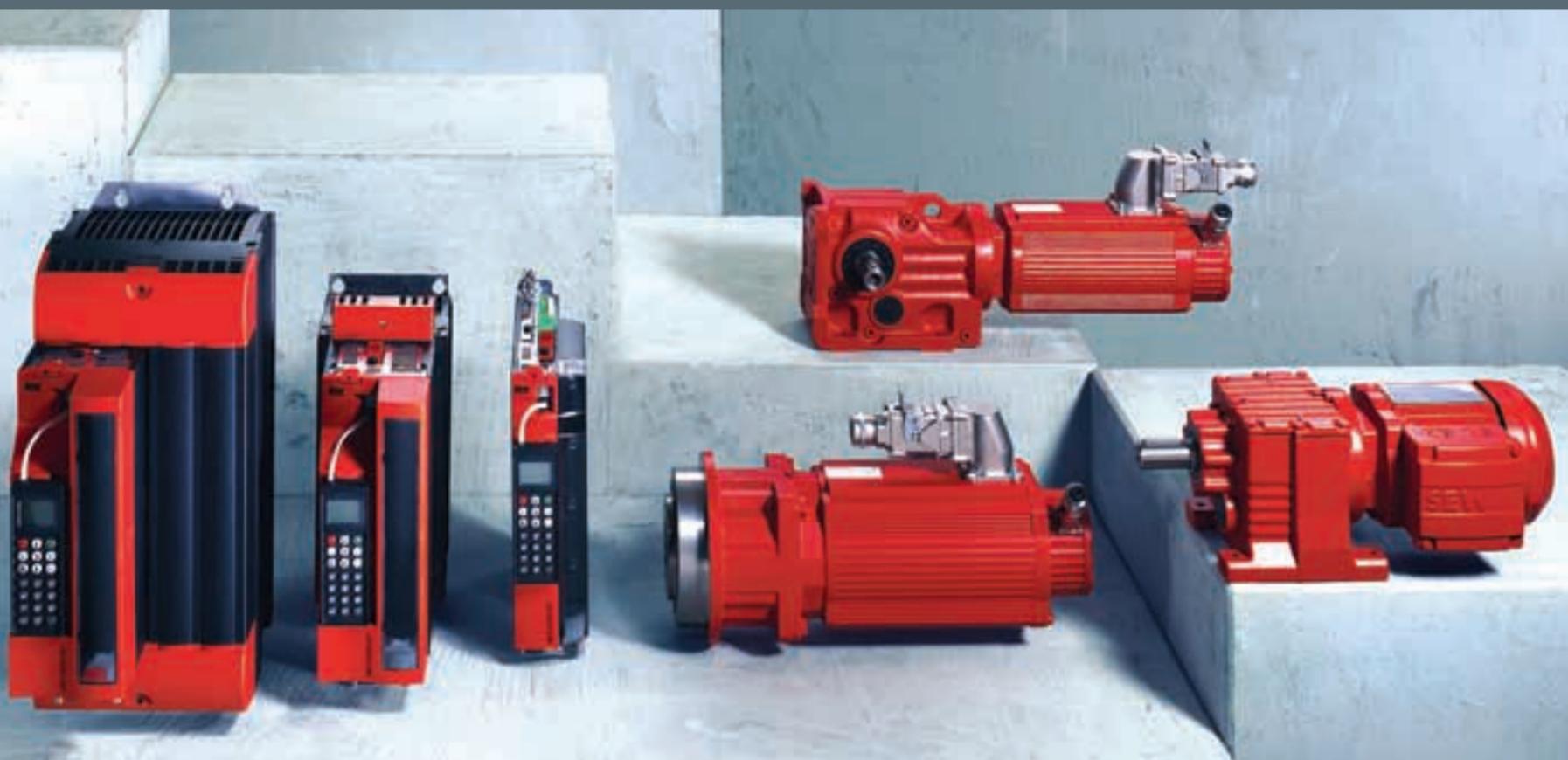
Linear actuator in 4 sizes

Bishop-Wisecarver Corp. has announced a new version of its LoPro linear actuator line. Units are available in four sizes and in belt, lead screw, ball screw and chain driven configurations, as well as un-driven. The latest version features carriage assembly radial load capacities nearly double that of the previous version, with size 4 now capable of handling radial loads up to 19,012 N.

www.bwc.com/products/lopro.html



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Pre-charge loss in bladder accumulators requires design compensation

Hydraulic bladder accumulators are used in a wide variety of mobile hydraulic systems to optimize system performance and prolong equipment life by absorbing shock, maintaining system pressure or providing a backup power supply of hydraulic energy.

The trade-off to using low temperature bladder compounds in mobile hydraulic applications is higher gas permeation rates through the bladder at working temperature.

Lost pre-charge can create an unsafe condition in an emergency

What most designers don't account for is the inherent loss in pre-charge that occurs over time due to gas permeation through the bladder. Left unchecked, this pre-charge loss leads to poor performance and premature bladder failure.

This issue is of most concern in mobile applications where there can be a significant difference in the temperature when the equipment is not in use (-60° to 100°F) and when it is at working temperature (0° to 250°F). The key is to fully understand the Permeability Factor of the selected bladder material for low temperatures vs. the potential pre-charge loss due to gas permeation at working temperature.

In that gas permeation cannot be avoided, it needs to be factored into the application specification. And, the pre-charge needs to be routinely checked and maintained throughout the life of the equipment application.

Bladder compounds for low temperature applications (-60° to 0°F) include the following, where the temperature listed is the lowest temperature in which the compound can be used: Nitrile, -10°F; Nitrile LT, -60°F; Hydrin, -40°F; Buty, -40°F; EPR, -40°F; and, Fluorocarbon, -10°F.

Nitrile bladders are considered suitable for most fluid power applications. The other compounds are designed to provide compatibility with a wide range of fluids, working temperatures and gas permeation requirements. To determine which material is appropriate for a given application, always refer to the fluid manufacturer's recommendation.

As you gain low temperature capability in a bladder compound, permeability of the bladder increases, and hence greater pre-charge loss due to gas permeation at working temperature. To show the direct correlation, the permeability

potential of each bladder compound was tested to define the relationship between bladder compound permeability and temperature.

When pre-charge is lost in a bladder accumulator, it changes the available volume in that application. In an emergency situation, there would not be enough fluid to complete the cycle, or the cycle would slow down.

Should pre-charge continue to be lost, the point is eventually reached where the bladder will be damaged. That "point" occurs when the maximum ratio exceeds 4:1 between the maximum pressure and the pre-charge. If, for example, the maximum pressure is 2000 psi, the pre-charge should not go below 500 psi. This is the point where damage to the bladder begins.

Depending on the application, such a loss of pre-charge could represent a signifi-

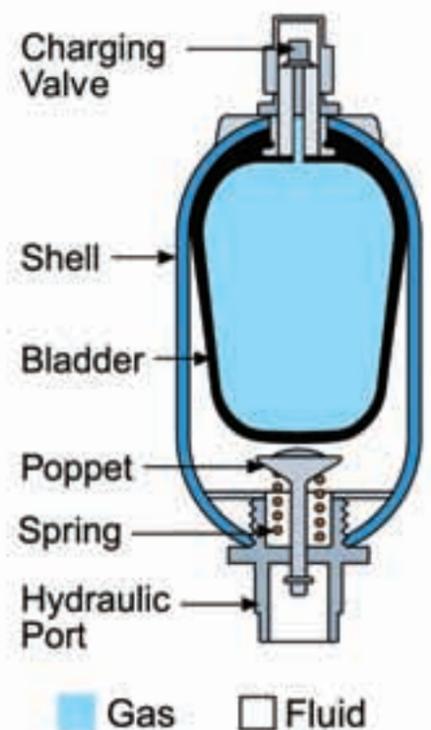
cant safety issue. Emergency power and emergency steering applications are prime safety issue examples.

Properly designed and sized for the application, and with pre-charge checked as part of a regular maintenance schedule, the bladder should last for the life of the application. In that bladder accumulators and the bladder compound selected are application-specific, there is no reason to replace a bladder unless it fails.

In some applications the working temperatures may be sufficiently moderate that pre-charge only needs to be checked on a yearly basis. The procedure for checking pre-charge is detailed in the Maintenance Bulletin for bladder accumulators.

Ed Godin is Technical Services Manager, and Dave Broad, Chemist, Parker Hannifin Corp., Hydraulic Accumulator Division. This article was excerpted from their White Paper, How To Deal With Pre-Charge Loss In Bladder Accumulators Due To Gas Permeation.

www.parker.com/accumulator



Hydraulic bladder accumulators consist of a fluid section and a gas section. The flexible rubber bladder acts as a gas-proof screen. The fluid around the bladder is connected with the hydraulic circuit so that the accumulator draws in fluid thus compressing the gas. When the pressure drops, the compressed gas expands and forces the stored fluid into the circuit.

Rubber magnet improves magnetic drain plug

For years, greasy handed mechanics have been dropping magnetic drain plugs and shattering the brittle magnets. Sintered magnetic materials, which are normally used to make these plugs, are easily cracked or chipped, so there is virtually no option for more durability. AlNiCo and ceramic magnets might not even survive the manufacturing processes that utilize crimping to secure them in place. A new rubber bonded magnet from The Electrodyne Company, is said to offer a better option for design engineers as well as for the mechanics using the product.

Plastalloy, a high-energy material that maintains its superior performance characteristics when subjected to the rigors of service in a hot oil environment, can also withstand the high impact of a crimping press, and can survive being dropped from virtually any height. That's what prompted design engineers from General Plug and Manufacturing (generalplug.com) to redesign their magnetic drain plugs to incorporate the benefits of the virtually unbreakable Plastalloy material.

To eliminate the problems of conventional drain plugs, General Plug forms a pocket in the end of its drain plug, and then inserts the rubber bonded Plastalloy high-energy magnet into the pocket. Material from the rim of the pocket is



Magnetic drain plugs attract and hold ferrous metal particles that circulate through your lubrication or hydraulic system.

then roll-formed over the Plastalloy during the patented process, holding it firmly in place. The "bead" that is rolled over the magnets edge is both uniform and functional, ensuring that the magnet is held firmly in place with no sharp edges to harm those removing or installing the drain plug.

Unlike the sintered materials, Plastalloy is resilient and durable enough to withstand the roll forming procedure. Since it requires no additional materials, retention by roll forming results in a more attractive and cost-effective end product than one where retention is achieved by means of epoxies, adhesives or retaining screws.

The patent-pending General Plug design features metal-to-metal contact between the bearing surface of the plug and the bearing surface of the tapped hole. This allows a proper torque-tension relationship to be maintained on the assembled plug. Sealing is accomplished by encasing an elastomeric washer-seal within a groove formed on the underside of the head of the plug (see drawing). Since straight threads are used, the plugs can readily be installed and removed.

Initially, the design is available in M20 and M22 sizes, although other sizes are attainable.

This article was contributed by The Electrodyne Company of Batavia, OH.
www.edyne.com

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Products: Hydraulics & Pneumatics

Two-braid hydraulic hose



Kurt Hydraulics has announced Kurt Tuff hose designed for hydraulic applications up to 6500 psi. The hose product can be bent twice as tight as standard SAE hose for half the bend radius. Reinforced internally with two braided layers of higher tensile steel wire, the hose has an oil and abrasion resistant synthetic outer cover. The hose withstands temperatures from -40° to 250°F. Diameters available range from 1/4 to 1 in. ID.

www.kurthydraulics.com

Direct-acting solenoid valve



SV-3100 Series 2-way solenoid valves from Omega are direct-acting units that feature brass and stainless steel construction and Viton seal material. The valve series temperature ranges from -10° to 137°C and is suitable for neutral media such as compressed air, inert gases, water and synthetic oils. The series is CE compliant and offers electrical connection options, a 1/2 in. conduit plug or cable clamp connector.

www.omega.ca

Non-marking suction cups



A line of non-marking TPU vacuum suction cups for handling flat, smooth, hard materials and painted products in a finished state have been announced by Anver Corp. The cups are available in 20-, 30-, 40- and 50-mm sizes in flat and single bellows designs that are suitable for level adjustment. Units can be supplied with fittings and suspensions for EOAT. Cups are transparent white and operate over a -4° to 176°F temperature range.

www.anver.com

Proportional flow control



Sauer-Danfoss has expanded its line of proportional flow control cartridge valves to include a more compact design said to provide higher pressure capabilities. The valves work in conjunction with hydraulic integrated circuits (HICs) to regulate the fluid flow that controls specific equipment operations. The pressure capability of the cartridge valves is 260 bar and maximum flow rates are 120 L/min.

www.sauer-danfoss.com

Power clamping units



The StrongHold Select series from De-Sta-Co is said to be a complete workholding system of hydraulic and pneumatic products, allowing users to secure all of the clamps holding the workpiece from a single power source. The system is said to provide significant reductions to set-up time, as operators can clamp an entire fixture from one location. Cost reduction is also said to be achieved through extended cutting tool life, as the rigid hold achieved by power clamping reduces vibration and cutting tool chatter.

www.destaco.com

Hydraulic valve controllers



EVDR series electronic controllers/drivers from HydraForce Inc. are said to be able to optimize hydraulically-actuated machine and vehicle control functions. Dedicated models are available for fan drive and clutch engagement control. Plug-in style models are designed for single-coil or dual-coil valve control. Multi-I/O models for stand-alone or slave logic op-

eration are housed in IP67-rated box enclosures. RS232 and J1939 CAN communications are supported, depending on model selected.

www.hydraforce.com

In-line manifolds



Clippard Instrument Laboratory has introduced aluminum in-line manifolds. The line is designed with a bottom T-slot said to allow for fast and secure installation. Available in 4-, 6-, 8- or 10-station models, the manifolds are also said to provide easy access for grouping valves, fittings or other pneumatic components.

www.clippard.com

Pneumatic rotary actuator



The Pneu-Turn rack and pinion pneumatic rotary actuator from Bimba is available with a variety of options such as angle adjustment, bumpers, adjustable cushions, dual shaft, square key and MRS magnetic position sensing. Cylinder bodies are 304 stainless steel, the actuator body and porting ends are made of an anodized aluminum alloy and the shaft is 303 SS. Shaft bearings are self-lubricating, sintered iron copper (ball bearings optional).

www.bimba.com

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New Products!

Feature: Sensors

Breaking the paradigm of weld cell inefficiency

By Dave Bird

When it comes to sensors, cables and connectors in weld cells, many automotive Tier One weld cell management people are so used to the high cost of constant replacement, downtime and lost productivity that they begin to think it's natural that weld cells are just that way. Sensors are constantly physically damaged by loading impact. Slag, weld debris, and heat ruin not only the sensors, but their associated connectivity. It gets to the point that most folks involved with weld cells start thinking there's not much you can do about it but put in a vending machine or some kind of

sensor dispensing system close at hand as if having replacement parts nearby is a viable process improvement.

It's time to dispel the myth that maintaining weld cells = high costs, constant replacement, and frequent maintenance episodes. Here's how to get started towards a more efficient weld cell production process.

If you're experiencing what you believe to be heavy consumption of sensors used in your day-to-day welding process, or you believe maintenance time is out of ordinary, an audit of each individual sensor in every weld cell location may be warranted.

A comprehensive weld audit will provide weld cell management with a complete review of weld cell sensor use. That means



Contact to the face (left) is damaging this sensor, while heat and slag are destroying the face of this sensor (right).

how well sensors are working, how well they are protected, and a means to lower sensor consumption and associated costs while significantly raising overall weld cell productivity. Here's just one example

of what happened when we did this for a large Tier One automotive supplier.

- From January 1 to April 27, 2007, their most problematic cell experienced 117 minutes of sensor-related downtime in that four month period.
- Five different types of M18 proximity sensors were mounted in simple L brackets at various points in the weld cell. These sensors were exposed to large helping of slag, weld debris, and heat in the MIG weld process.
- Unlighted connectors supplied through vending machines were experiencing extensive burn through.

The bottom line was that the downtime on this machine was assigned a value of \$422 per minute times 117 minutes of sensor related downtime, which annualizes out to \$148,000.

Following an audit, all existing sensors and connectors were removed and replaced with two appropriate application-

Perform a complete review of weld cell sensor use

specific sensors. The sensors were installed in heavy Bunker Blocks with rapid-change out ready Prox Mounts or PTFE-coated Prox Mounts. Original unlighted sensor connectors were replaced with visible lighted TPE versions (which have high resistance to weld debris, slag, nicks, flex, etc.), all covered with medical grade silicone weld resistant jacketing and sealed with Weld Repel Wrap. Once this was accomplished, the cell had a significantly upgraded sensor system protected from the weld environment by the latest in heat and slag protective technology.

After three months of evaluation:

- Zero sensor failures due to slag or heat.
- One sensor was damaged when a heavy component was dropped on it, but replacement downtime was not charged as a "Sensor Failure."
- No maintenance interruptions due to weld cell hostilities or standard operational conditions were experienced.

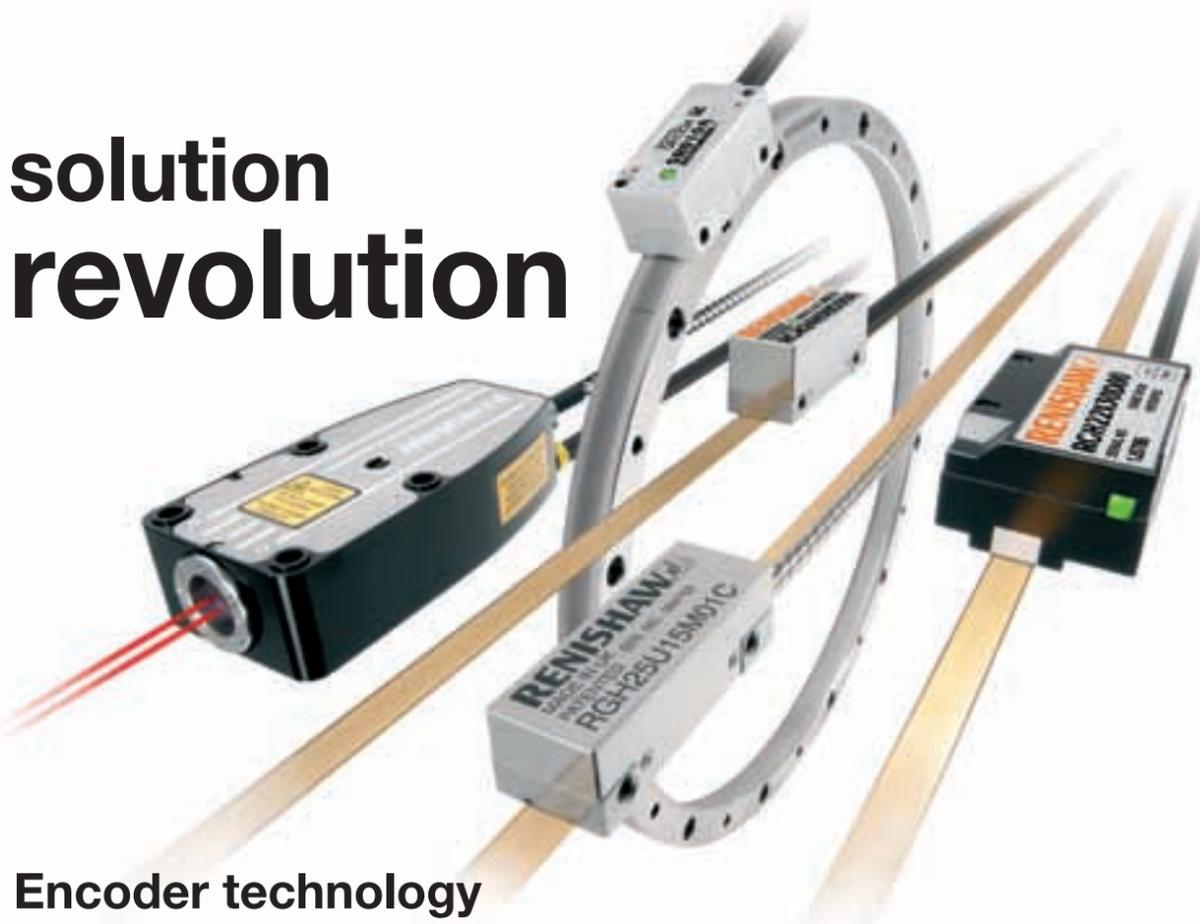
The bottom line: excluding cost of material for retrofit, this once problematic cell is now at a run rate to produce an overall per annum net savings of \$137,000, allowing maintenance personnel to be more productive. This reduces the dependency on a vending machine to supply high consumption components that shouldn't be highly consumed devices in the first place!

Dave Bird is Balluff Welding Industry Manager.

www.balluff.com/welding

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Datasensor SR21 photoelectric sensors from IDEC have throughput speeds said to be up to 2.5x faster than competitor sensors. The micro-processor controlled slot sensors have a 2 mm slot width, 12-bit resolution and a 20 µs response time that translates to a throughput speed of 25 kHz. The sensor also has a unique optical feed back correction system, providing stable performance over its specified temperature range.
www.idec-ds.com

Touchless rotary position



Novotechnik lines of non-contact and fully touchless rotary position sensors now include six different series of rotary position sensors. The sensors feature two sensing technologies. The units extend from miniature sensors measuring 13 mm in diameter for to 48 mm rotary angle sensors sealed up to IP69K. Specifications include programmable angular range to 360°, resolution to 14 bits and up to unlimited mechanical life.
www.novotechnik.com

Linear position indication



ifm efector has introduced a line of sensors that continuously indicate the position of linear valves. The Valvis sensor is installed on top of a linear valve to detect the stroke position up to 80 mm. The sensor monitors single-seat and double-seat valves providing a condition-based monitoring solution. On double-seat valves, the sensor detects the open position, closed position and seat-lift cleaning position. On single-seat valves, the sensor detects the open position, closed position and provides an additional output for seal contact wear.
www.ifmefector.com

Measuring speed or angle



The EcoSpin from Baumer is a non-contact modular encoder which delivers an incremental quadrature encoder output at resolutions up to 0.5°. The 10 mm wide sensor housing and rotary magnet can be installed in less than a minute using the included mounting spacer. Several different resolution possibilities are available by selecting different ring and interpolation combinations.
www.baumerelectric.ca

Pressure sensor adds control



Turck has introduced a programmable output pressure sensor that allows the user to select the output as either two switch points or a 4 to 20 mA analog output with one switch point. The switch points are PNP/NPN programmable. Sensors with ranges from 1 to 40 bar are now extended to -1 bar, allowing the switch point or analog start point to be programmed in the vacuum range to detect pressure in a positive pressure unit. The IP67 sensors also allow the user to select units measurement.
www.chartwell.ca

Broad IR measurement



Fluke Electronics Canada has announced the Fluke 566 and Fluke 568 thermometers, which feature broad infrared temperature measurement functionality, an on-screen menu system and a dot-matrix display. Both of the handheld thermometers combine contact and non-contact temperature measurement capability. The thermometers provide a measurement range from -40° to 800°C (Fluke 568) or -40° to 650°C (Fluke 566) at 1% measurement accuracy. Both models include a K-type thermocouple bead probe.
www.flukecanada.ca

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Editor's Choice

TV-rated molded switches



NKK Switches has announced the JWL series of dc-rated power rocker switches with a TV rating. The snap-in mounted switches, rated at TV-8, are designed to handle inrush currents in excess of 160 A. In addition to the TV-8 rating, units have UL, CSA and VDE approvals, with a flammability rating of UL94V-0. The rocker switches can be specified with integrated flat or barrier flanges. These switches are offered with black, gray or ivory housings and barriers. Rocker cap color options include black, gray, ivory and red. SPST, SPDT, DPST or DPDT units are available.
www.nkkswitches.com

IP65 802.11abg hotspot



ProSoft Technology RadioLinx wireless products include the 802.11abg Industrial Hotspot with IP65-rated water resistant, dust-proof enclosure (RLX-IH65W). The radio functions as an access point, repeater or client and its water resistant enclosure permits it to be directly installed in harsh industrial or environmental areas. The unit offers Power over Ethernet (PoE), which allows the radio to be installed next to the antenna, reducing antenna cable loss and maximizing range.
www.prosoft-technology.com

Outdoor enclosures

Rittal CS Basic outdoor enclosures are resistant to humidity, temperature fluctuations and sunlight, and extreme conditions such as saltwater mist, earthquake resistance, and protection against vandalism. Concealed eyebolts inside the rain canopy can be accessed to provide crane transportation. Rain canopy ventilation louvers are also provided with a 25 mm roof overhang. The 1200 mm wide versions can be provided with two lockable doors using a removable centre bar or with overlapping doors.
www.rittal.ca/outdoor




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www.wago.us/jumpflex.htm

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Miniature slide switches



C&K Components has developed a series of miniature slide switches with a profile height of 2.5 mm and one-pole “G” and “J” surface mount terminations. The JSM series is available in 1T, 2T and 3T configurations with momentary and maintained contacts. The slide switches have an electrical rating of 0.3 A at 4 Vdc and a minimum electrical life of 10,000 cycles. Actuator travel is 2 mm and operating temperature range is from -10° to 60°C.

www.ck-components.com

Multiple protocol converter



The Data Station Plus multiple protocol converter from Omega was designed to provide all of the features of G3 series HMIs, (without a display) and provides enhanced features for data acquisition or multi-zone PID control applications such as data logging, protocol conversion and remote machine monitoring and control. The unit acts as a nexus for industrial data collection and management. With three built-in serial ports and a 10 Base-T/100 Base-TX Ethernet port, the unit performs protocol conversion, allowing disparate devices to communicate seamlessly with one another.

www.omega.ca

Through-panel terminals



Weidmuller has introduced a range of through-panel terminal blocks – the WGK Series – that address the challenge of distributing currents of differing potentials through the panel walls of control cabinets. The terminal blocks feature housing halves that inter-lock and enable a through panel termination system. Terminal blocks are available to accommodate UL/CSA-rated wire size range of AWG 30 – 4/0 (4 to 95 mm²), at 300 or 600 V. Units have a flammability class rating of UL 94-VO to meet global approvals including UL 1059 and CSA.

www.weidmuller.ca

Hospital-grade cordset



Interpower Corp. has added a North American Hospital-Grade Cordset to its product line. The cords and cordsets carry the “green dot,” signifying that they have been designed and tested for grounding reliability, assembly integrity, strength and durability for use in hospital and medical settings. The cords and cordsets are UL and CSA approved and rated for a maximum 13 A with service at 125 Vac. The medical cordset is available with a NEMA 5-15 clear plug, 16/3 SJT black cable, and

a black or silver IEC 60320 C13 straight connector.

www.interpower.com

Adjustable flat air nozzle



The Exair 2 in. High Power Super Air Nozzle produces a flat 2 in. wide airstream with a blowing force of 2.2 lb when mounted 12 in. from the target. The adjustable force is said to be >3x that of ordinary air nozzles. Nozzle uses patented technology to maximize entrained airflow while maintaining a 83 dBA sound level. Air is released through the .025 in. air gap opening that is set with a stainless steel shim positioned between the body and removable cap. Air consumption is 37 SCFM at 80 psig.

www.exair.com/2hpsan.htm

Gel pad vibration isolators



The V10Z61MSN series of silicone gel pad vibration isolators from Advanced Antivibration Components are designed for light to medium loads of from 0.5 to 2 kgf up to 15 to 50 kgf per mount. The highest damping effect arises when the gel is compressed 10 to 30%. The metric mounts operate effectively from -40° to 200°C. Units are said to offer excellent chemical resistance and are low in compression set.

www.vibrationmounts.com

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Advisory Board Directions



Design is best deployed strategically, not tactically, to benefit Canadian business

By **Tim Poupore**

We all perform many duties and wear many hats in our professional and personal lives these days. One of mine is serving as the Chair of the Design Industry Advisory Committee, or DIAC.

DIAC is a cross-disciplinary think tank and design research group established by

Toronto Economic Development in 2001. Its members include representatives of the six design disciplines in Ontario (industrial, graphic, interior, architecture, landscape architecture and fashion), government (Toronto Economic Development and MEDT) and Industry (CME – Canadian Manufacturers and Exporters) among others. Its research is focused on leveraging the talents and problem-solving skills of Ontario's vast and talented design

workforce to expand both economic and social opportunities.

We've done some interesting work over the years, and much of it has a direct bearing on Ontario's manufacturing sector. DIAC's first research initiative, entitled Design Matters, was a study of the design industry conducted in 2004. It presented a profile of the Ontario design workforce and a four-step Action Plan that would enable the public and private

sector to use design at a higher level. We noted that Ontario has a critical mass of 40,000 designers, and the Toronto has the third largest design workforce in North America (after New York and Boston). That's a considerable resource that many are making good use of – but we can do better.

Most businesses still apply design tactically, as a solution to an immediate problem. A better approach is to deploy design strategically, as a methodology capable of delivering ever-improving products and services that meet consumers' needs. We're convinced that Canada can do more with design. We believe that if manufacturers are given the right tools, direction and encouragement, we can all lead more prosperous lives. The same improved economic results that other industrialized nations have enjoyed by following a more design-led path can be ours as well.

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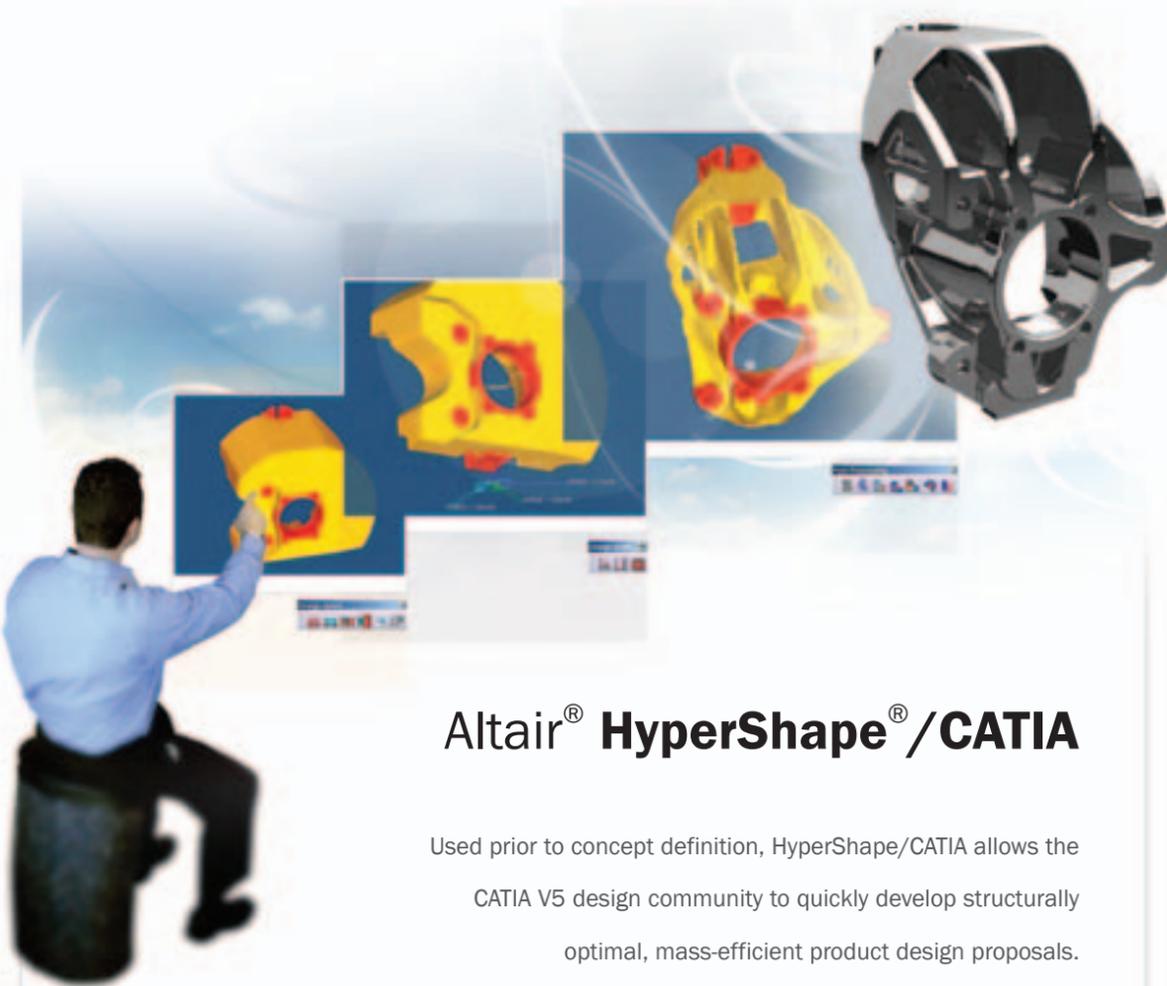
DIAC's most recent research, conducted in collaboration with the Greater Toronto Marketing Alliance, positions the GTA as a design-rich region and explores the positive contribution of local design talent on advanced manufacturers based in the GTA who are global leaders in their industries. The research was conducted by Arlene Gould, DIAC's strategic director, and the final report should be available on both the GTMA and DIAC web sites by the time you read this. Visit greater-toronto.org and diac.on.ca to read more about it, and see Renderings on page 5 in this issue.

One of our most promising current projects is our "Profit by Design" seminar series. The first of these presentations was sold out at IDEX in September where we explored the topic "Design for Sustainability." We featured speakers from manufacturers (InterfaceFLOR and Umbra) and retailers (Home Depot Canada) who have dealt with the growing importance of sustainability in their markets, and presented case histories that were both entertaining and enlightening.

We'll be adding at least three new seminars to the series for future events, and we'll be bringing them to you in partnership with CME (cme-mec.ca). Topics include: Design & Advanced Manufacturing, Branding for Export Success, and Best Practices in Design Management. Dates and locations have yet to be finalized, but we hope to conduct these in a variety of locations across Canada. We'll be announcing more about this seminar series in the coming months, likely in DPN, CME's 20/20 magazine and other outlets, so watch this space for more information.

Businesses everywhere are recognizing and benefiting from the use of design-thinking and design-led strategies to make products and services more valuable to consumers. The tools exist – we just need to learn to use them better.

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Tim Poupore is President of Ove Industrial Design Ltd. (oveid.com), Past-President of the Association of Chartered Industrial Designers of Ontario (acido.info) and Chair of the Design Industry Advisory Committee (diac.on.ca).



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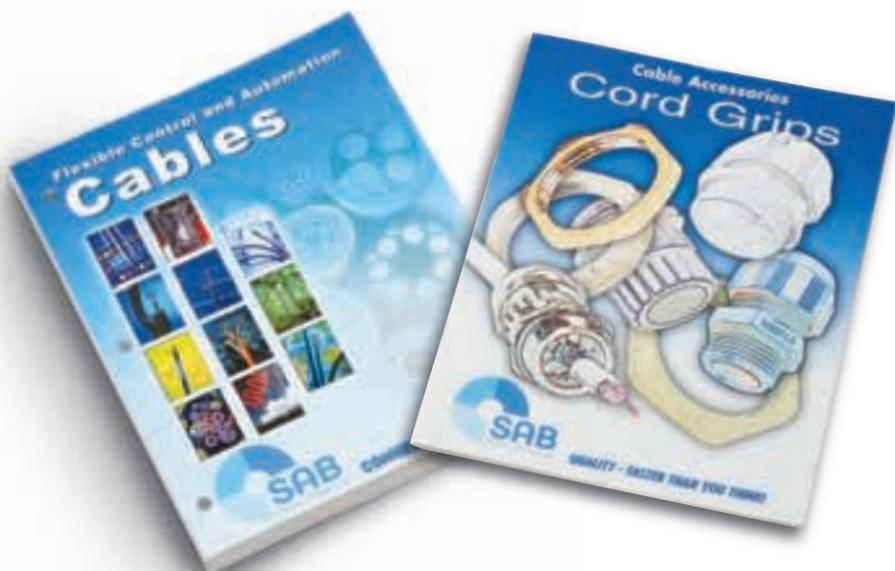
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