Inside: Adhesives & Fasteners ■ Switches ■ Motion Control

DPN
DESIGN PRODUCT NEWS
Covering the total design engineering function in Canada
June/July 2010

Lever spool valves

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www.clippard.com/levervalves

Belt driven motion control

Bishop-Wisecarver Corp. has announced the HepcoMotion PDU2M Profile Belt Driven Unit, a high capacity version of its PDU2 model. The PDU2M incorporates a carriage that contains four extra rollers on each side in order to withstand increased moment forces.
www.bwc.com

NX 7 embraces PLM

Siemens PLM Software has announced the latest enhancements to NX 7 include significant new functionality throughout all aspects of the software. In addition, NX, together with Teamcenter software, support a new High Definition PLM (HD-PLM) technology framework.
www.siemens.com/nx

Volume 38 Number 4

PM# 40063602

Wind tunnel to boost vehicle development

Automotive Centre of Excellence on campus of the University of Ontario Institute of Technology has support of resurgent GM

By Rob Colman

One of the largest climatic wind tunnels in the world is revving up at the University of Ontario Institute of Technology (UOIT).

The new General Motors of Canada (GM) Automotive Centre of Excellence (ACE) at UOIT has been designed to be a state-of-the-art R&D facility for the automotive sector and many others including the aviation sector, luring industry partners from around the world to access its equipment and expertise. Construction of the high-tech centre began in 2007 at UOIT's Durham Region campus east of Toronto. The climatic wind tunnel, which is the jewel in the centre's crown, is large enough to accommodate cars, buses, trucks, trains and airplane wings.

The centre will house research and development tools in the areas of vehicle dynamics, noise and vibration, thermal climatic wind tunnel, structural durability testing and the ability to accommodate future automotive fuels like hydrogen.

According to George Bereznai, the Dean of Engineering at UOIT, "Planning for the centre started in 2003 as part of a large technological investment by GM with support by the Ontario and Federal governments, in recognition that the technology of automotive design and manufacturing was changing rapidly, new hybrid and electric vehicles were coming along, together with extensive automation, and there was a lot of competition from overseas automakers. "General Motors is making a multi-billion dollar investment, principally in Oshawa, and since UOIT was just starting at the time, the governments saw the value of having this type of facility at a university in close proximity to industry – close to the manufacturer and design community but on a campus where the designers would come to campus instead of students and professors going to the manufacturer.

"This set-up creates more of a two-way street. It allows us the opportunity to broaden the centre to any OEM but also to broaden out the use of the facility to anything that is motive, such as planes, wind turbines and trains."

The development of the centre wouldn't have been possible without GM's support, and the company has committed to buying a full shift in the facility for the first two years of operation.

The strength of the team at ACE was bolstered by the addition of Gary Elfstrom, who was recently named Director of Business Development for the facility. Elfstrom was a co-founder and later vice-president of business development at Aiolos Engineering, a Toronto-based global company that designs, builds and maintains test facilities around the world, including wind tunnels. In fact, Aiolos is the company that designed the ACE wind tunnel.

"There isn't anything available in the U.S. or Canada right now that can do what the ACE can do, which is to say, any of the competing auto companies can come here with a problem, do a test and figure out with some help from the university how to make it better," said Elfstrom. "This is something very unique; in fact, there's only one other facility like this in the world and that's in Stuttgart, Germany."

Continued on page 7

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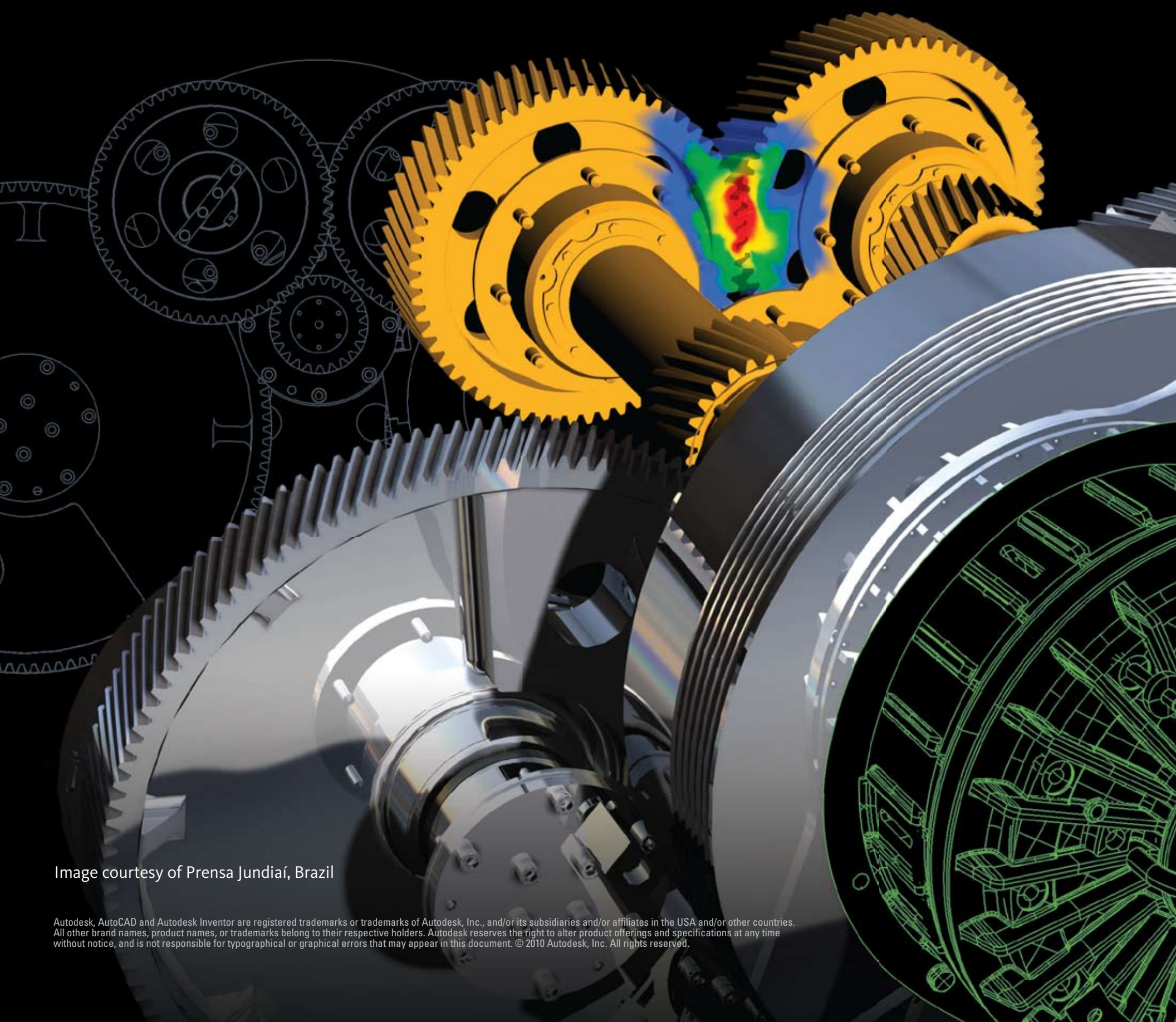

Image courtesy of Prensa Jundiaí, Brazil

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Breakout Board Kit for CN1 Control Interface	$89.00 ASD-BM-50A		$195.00 2090-U3BK-D4401
10' Motor Feedback Cable	$49.00 SVC-EFL-010		$141.00 2090-UXNFBY-S03
10' Motor Power Cable	$29.00 SVC-PFL-010		$82.00 2090-XXNPY-16S03
Configuration Software	FREE SV-PRO*		$75.00 2098-UWCPRG
Complete 1-axis 100W System	$965.00		$2,435.00

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

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

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

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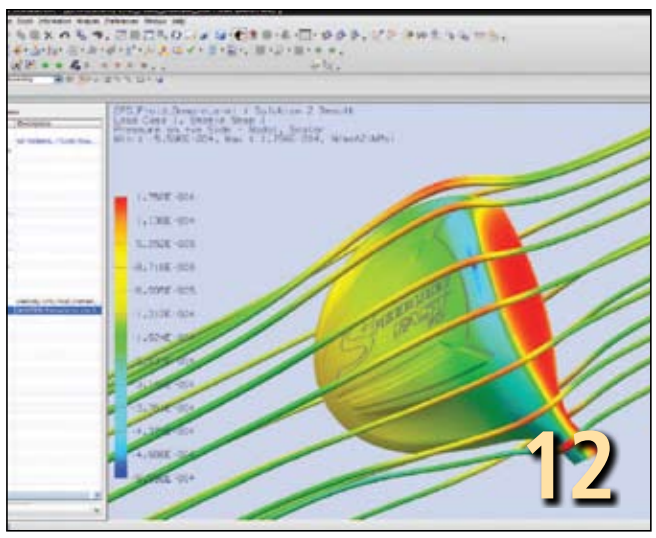
In this issue

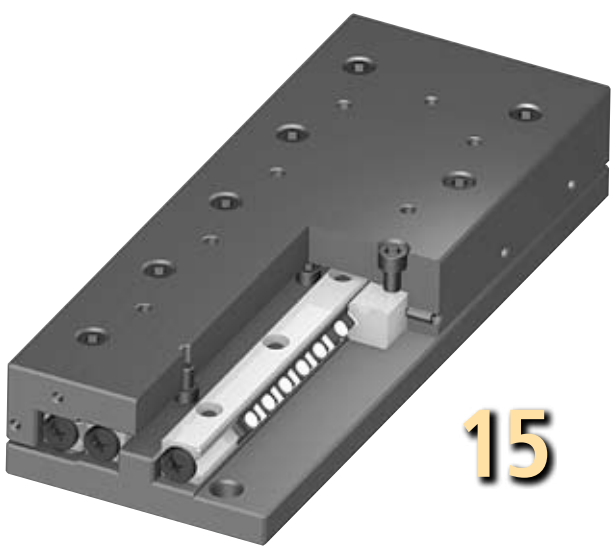
CFPA honors top fluid power college students, retiree

This year's Canadian Fluid Power Association AGM was marked by honors for three graduating technical college students, and the retirement of chair John Bachmann (holding gift). Above: CFPA's 2010-2011 Board of Directors.



CAD, CAE allow golf club designer to grab market share

Adams Golf designs, assembles, markets and distributes premium-quality, technologically-innovative golf clubs. Computational fluid dynamics software from Siemens PLM Software is helping it succeed.



Factors to consider when choosing a crossed roller bearing

A primer from NB Corporation reveals that crossed roller bearings or slides work like ball bearing slides, except the bearings housed within the carriage are cylinder-shaped. Also covered is the technology surrounding caged bearings.

Evolution not revolution – the route to fuel economy for manufacturers

Recently enacted U.S. Corporate Average Fuel Economy legislation is driving automotive OEMs to refine their designs. Ford's EcoBoost engine (above) for the Taurus is one example.

DPN DESIGN PRODUCT NEWS

DIGITAL EDITION

June/July 2010

DPN editor
Mike Edwards

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

Interactive stuff

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

Digital edition sponsored by: FESTO

DEPARTMENTS:

THIS MONTH ON dpncanada.com

EXCLUSIVE ONLINE BLOGS

Industrial Design blog
David Duncan is smitten with his tablet, and it's not the iPad!

Intellectual Property blog
Charles Boulakia prepares you for that dreaded "cease & desist" letter

Advertisers Index

Renderings

Payoff from climate-related technology investments varies widely across Canada

By Mike Edwards, Editor

Regardless of whether you believe man-made greenhouse gas emissions (GHGs) affect our climate or not, Canada's provinces have earmarked $11.8 billion in related GHG-reduction technology investments over the next four years. It's easy to see that the business opportunity here is certainly compelling.

In its report released last month, *The Economic and Employment Impacts of Climate-Related Technology Investments*, the Conference Board of Canada provides a blow-by-blow, province-by-province examination of what's in store from 2010-2014 across the country. The report is available as a free download from www.conferenceboard.ca.

Alberta is making use of compliance options

In Canada, the federal government has established reduction targets and put programs in place to encourage and fund investments that will reduce emissions, the report states. Similarly, at the provincial level, each province has set a target for emissions reductions and developed a climate action plan that reflects the risks and opportunities in that province, it adds. "There are many tools available to encourage emissions reductions. These tools include carbon taxes, emissions caps, emissions intensity caps, offsets, voluntary carbon markets, exchange-based emissions trading, performance standards, and a multitude of programs to contribute to the development and commercialization of technologies and the cost of investments that will reduce emissions."

According to the report, the tools can be sorted into four main categories: those that use price signals to change behavior; those that mandate performance or emissions standards; those that develop low-emitting technologies; and, those that implement or commercialize low-emitting technologies.

Not surprisingly, Alberta tops the list, out-investing the rest of Canada's provinces with a blend of climate-related technology funds coming in at close to $6.1 billion. That province's vast oil extraction projects have multifaceted environmental mitigation challenges that make it a lightning rod for criticism, R&D and machinery acquisition.

The last item, machinery, appears to be Alberta's Achilles' heal as far as its GDP bottom line is concerned. "Alberta ... would see only $70 million in increased real gross domestic product (GDP) per $100 million invested. The lower return on investment in Alberta is due to the higher dependence on out-of-province suppliers (as compared with Ontario)," according to the report.

"Ontario has the strongest manufacturing industry, and as such, every $100 million invested in Ontario is estimated to result in $107 million in real GDP." Ontario placed second in overall climate-related technology investment, with $2 billion earmarked over the 2010-14 period.

Still, the Conference Board of Canada (CBoC) feels "The Alberta model appears to be working, based on the revenues generated to date and the fact that emitters are making use of all compliance options. They are reducing emissions, purchasing offsets, and trading in credits, as well as contributing to the technology fund."

The CBoC notes that "projects available for technology investments primarily involve industrial implementation, which accounts for 72% of the total spending. Another 5% goes toward residential implementation. Some 12% flows to research and development, while the remaining 11% goes to industrial construction.

The report concludes:

- History is too short to evaluate the effectiveness of technology investment tools.
- Alberta and Ontario have both the highest levels of GHG emissions and the highest levels of technology investments.
- Technology investments will produce greater benefits than estimated in this report to the extent that those technologies are exported.

Solar, geothermal and wind energy aren't mentioned in the report. However, each province has positioned itself to provide technology investment to developers of these energy alternatives.

Study this report, check out opportunities in your province – and don't miss this limited-time offer.

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

By Design

CFPA honors top fluid power college students, John Bachmann

MISSISSAUGA, ON – This year's **Canadian Fluid Power Association** (www.cfpa.ca) annual general meeting (AGM) was marked by honors on two fronts.

The just-retired John Bachmann of Wainbee and chairman of the CFPA (inset); Nigel Bishop (right), publisher of *Design Product News*, presents the *DPN*-sponsored Canadian Fluid Power Association Scholarship to graduate Christopher Angus of the Automation & Robotics Program at Centennial College.

John Bachmann, the chair of the CFPA has retired and was honored by the association for his service. Bachmann, a *DPN* Editorial Advisory Board member, was the corporate sales, marketing and quality manager at **Wainbee** (www.wainbee.com), but plans to remain active in the **Industrial Careers Pathway** (www.industrialcareerspathway.com) program and curriculum at Mohawk College and plans to continue there in the fall. In his last report as CFPA chair, Bachmann reported that the ICP program at **Mohawk College** (www.mohawkcollege.ca) has produced 18 graduates.

Honors at the AGM in the form of scholarships also went to three college students graduating from fluid-power related programs at **Centennial College** (www.centennialcollege.ca) and Mohawk.

Receiving the Hans de Waard Memorial Scholarship sponsored by Bosch Rexroth Canada Corp. (www.boschrexroth.ca) was Kevin Griese of Mohawk's Industrial & Mechanical Engineering Program.

Qingbo Yu of the Centennial College Automation & Robotics Program was awarded the Edward Stock Memorial Scholarship, sponsored by **Flodraulic Canada** (www.flodraulic.com).

The *DPN*-sponsored Canadian Fluid Power Association Scholarship went to graduate Christopher Angus, also of the Automation & Robotics Program at Centennial.

Henkel-Loctite workshop knowledge sticks

Henkel-Loctite Canada presents regular training sessions for customers and staff. At the recent Advanced Adhesive Technology Workshop for Assembly presentation, Rene Levy (left), senior adhesives & sealants specialist with **Henkel Canada Corp.** (www.henkelna.com/loctite) demonstrated hands-on examples of bonding technologies. The workshop covered bonding joint design principles and provided a broad adhesive technology review from light cure to cyanoacrylates.

German Chancellor Angela Merkel's presence showcased the "sustainability" theme and provided support for the volcanic ash-challenged Hannover Fair. With airports closed, show organizers chartered buses to bring attendees and exhibitors from nearby countries.

Hannover rebounds despite flight ban

This year's **Hannover Messe** (www.hannovermesse.de) in Germany, staged under the keynote motto of "Efficiency, Innovation, Sustainability," attracted bookings from more than 4,800 exhibitors from 64 countries, matching the totals for the "boom year" of 2008.

Major travel limitations resulting from the international flight embargo impacted both exhibitor participation and visitor attendance, but Deutsche Messe was quick to launch a series of measures to ease the situation, chartering a fleet of buses to bring several hundred exhibitors from across Europe to the show.

From Turkey alone, some 150 exhibitors took the 50-hour ride. And from New Zealand, an exhibitor turned up after a 134-hour travel marathon!

"Many hundreds of people demonstrated to us just how important it was for them to be at Hannover Messe," von Fritsch remarked. The air travel ban did, however, prevent around 300 exhibitors from arriving in time to set up their stands, with exhibitors from Asia and the Americas most severely affected.

Attendance from outside Germany was down by about half. The total visitor count of 150,000 was roughly 20% below the previous year's figure. Attendance from Asia and North America suffered the most.

Some Canadians were affected by the flight ban, including one group scheduled to arrive during the show.

News in Brief

PTC names new CEO

PTC (www.ptc.com) has named Jim Heppelmann the new CEO, effective October 1, 2010. Heppelmann, who is currently president and COO, will succeed Richard Harrison, who will serve as executive chairman.

SKF Lubrication moves

SKF Lubrication Solutions division (www.skf.ca) has moved to a 22,000 ft^2 facility in Mississauga, ON. The division will have sales, customer service, engineering and service operations together. This facility will also be home to the **SKF Economos Sealing and Engineered Plastics** team.

Sensor design resources

Electronic components distributor **Digi-Key Corp.** (www.digikey.ca) has launched Sensor Solutions Technology Zone, a website dedicated to providing comprehensive sensor design resources to engineers. Other technology zones offered by Digi-Key include resources for lighting, microcontrollers and wireless (www.digikey.com/technologyzones).

Playfoot promotes Agile Manufacturing

Bruce Playfoot is now **Agile Manufacturing, Inc.**'s outside sales agent (www.agile-manufacturing.com). Playfoot (left) will focus on selling V-Flash and ProJet 3D printers the company distributes in Canada for **3D Systems, Inc.** He will also promote the Handyscan line up of reverse engineering laser scanners from **Creaform**, as well as **Argyle Materials, Inc.,** a supplier of filament spools for 3D printing.

Bosch Rexroth Canada names new management

Bosch Rexroth Canada (www.boschrexroth.ca) has appointed Tom Light as president and general manager. Light joined the company in March 1997. Boyd de Waard, a 35-year veteran with the company, steps down as president and GM to take over as regional sales director for the Americas reporting to Bosch Rexroth headquarters in Germany.

With Bosch Rexroth Canada since 1997, Tom Light is now its president and GM.

Calendar

September 13-18, 2010. Chicago. IMTS (www.imts.com), the International Machine Tool Show for manufacturing technologies.

October 5-7, 2010. Toronto. Canadian Manufacturing Week (www.sme.org/cmw) at the Toronto Congress Centre featuring Advanced Manufacturing, Weld Expo and Physical Asset Management exhibitions and conference. Presented by the Society of Manufacturing Engineers.

November 9-12, 2010. Munich, Germany. Electronica 2010 (www.electronica.de/en) trade fair includes an electronics summit, automotive conference and wireless congress.

Phoenix Contact Canada GM Kevin McKenna.

Phoenix Contact plants seeds for success

MISSISSAUGA, ON – At a breakfast briefing held in conjunction with the opening of the Hannover Fair (story above), Phoenix Contact Canada revealed the steps it has taken to maintain success.

According to Kevin McKenna, Phoenix Contact Canada general manager, the company added two new distributors in the Quebec market last year, "the only region in Canada that grew in 2009." The company can now support the region from a new 3,500 ft^2 facility in St. Laurent, QC.

Serving western Canada, the company is adding two representatives in both B.C. and Alberta in 2010, as well as establishing a nationwide Technology Solutions Centre.

Cover Story

Climatic wind tunnel good for auto, aerospace clients

From Front Page

As an example of other clients that are interested in the ACE facility, Elfstrom points to a Quebec car company called HGT Supercar. "They designed their car entirely with computational fluid dynamics and computational structural," Elfstrom explained. "Now they think they might need to do some validation of the aerodynamics, particularly of cooling systems – the underflow, the through-flow, all those kinds of things. That you need to do under true atmospheric environmental conditions. This organization could not afford their own system."

The Automotive Centre of Excellence wind tunnel assembly arrives at the University of Ontario Institute of Technology construction site in June 2009.

On a larger scale, Elfstrom notes that Bombardier is looking at examining the icing of components for their aircraft. The ability to have a chunk of a wing examined at once is a key advantage of the ACE facility. "You can't do scale icing (tests) truly effectively," says Elfstrom. "Not to mention thermal management of a cockpit. This is something you can't do through computational work — you have to validate it. (By using a facility like ACE) you drive down the time for development."

The climatic wind tunnel has extreme weather capabilities and a rotating chassis dynamometer that can be swapped in and out with a moving ground plane or rolling road. This will be the first wind tunnel in the world where these climatic test and aero systems co-exist.

The climatic wind tunnel will have:

- A variable nozzle with a range from 7 to 13 m^2
- The ability to create wind speeds exceeding 240 kph;
- A 100°C temperature range, from -40° to 60°C;
- The ability to produce five to 95% humidity; and
- A solar array to replicate the effects of the sun.
- 710 kW dynamometer on an 11 m diameter turntable

The simulations will include:

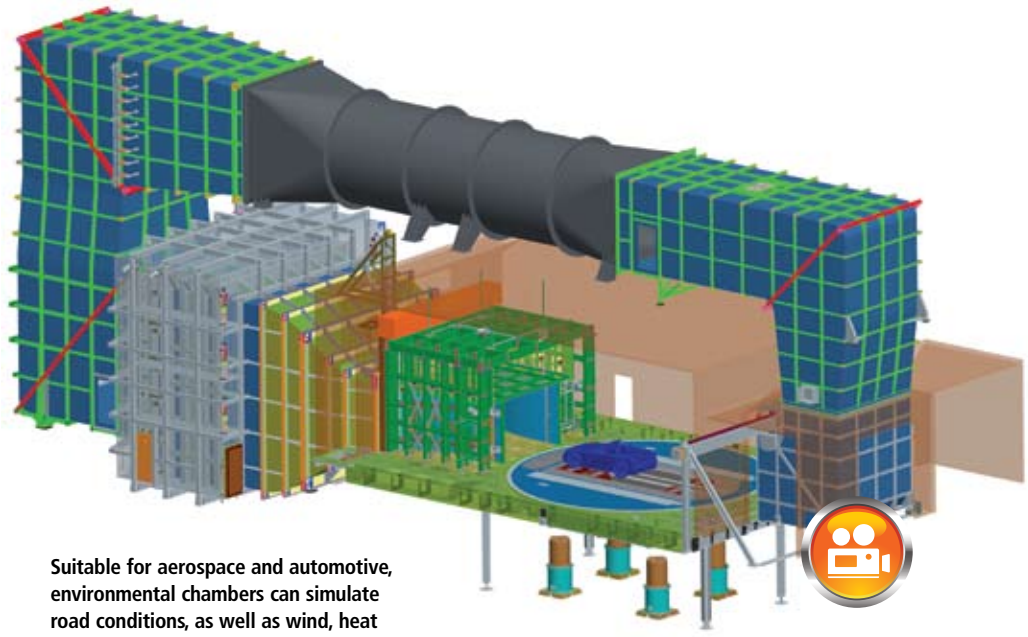
- Air humidity;
- Air speed;
- Air temperature; and
- Intensity, spectrum and direction of the sun.

Along with extreme weather conditions, it will test road load conditions, vehicle stability and variable wind directions using a rotating chassis dynamometer.

Two environmental chambers will be located beside the wind tunnel allowing for a variety of tests under controlled conditions of temperature and humidity, such as cold starts, extended idles and hot soaks. The large chamber will also include a solar array and a dynamometer to accommodate road load conditions.

A four-poster shaker will be located in one of three environmental chambers. It will have the ability to test full vehicle body structures for durability and the detection of buzz, squeak or rattle. In addition, a multi-axial simulation table (MAST) will be located in a semi-anechoic chamber to test products for structural durability and the detection of noise and vibration in three dimensions.

www.gm-ace.uoit.ca



Suitable for aerospace and automotive, environmental chambers can simulate road conditions, as well as wind, heat and cold, including ice and snow.

Products: Process Automation

Robots for packaging

Adept Technology has shipped the first of its USDA-accepted robots. The Adept Quattro s650HS is said to be the only USDA-accepted parallel robot available for meat and poultry processing. The robots are suitable for high-speed manufacturing, packaging, material handling, and assembly applications. The design of the Quattro differs from conventional parallel robots in that it features a four-arm kinematic design.
www.adept.com

Data loggers and readers

Omega's CE compliant OM-80 series of data loggers and readers are said to provide a reliable solution for cold chain environmental monitoring. Each logger can store up to 10,000 readings and is reusable. Each package of data loggers comes with a certificate stating NIST-Traceability (No Points). Built-in LEDs display high and low alarm verification indicating whether or not measured temperatures have remained within the user programmable alarm window throughout deployment.
www.omega.com

1½ and 2 in. port size L-O-X valves

Ross has introduced 1½ and 2 in. port size L-O-X valves following the launch of its ¼ and 3/8 in. port size L-O-X valves. The 1½ and 2 in. models are identified by their shape, red handle and yellow cast body; a benefit in to plant maintenance and equipment repair personnel when searching for energy isolation devices following lockout/tagout practices. The valves' positive action (two positions) and push/pull design provides direct manual operation.
www.rosscontrols.com

Retractable pH sensor

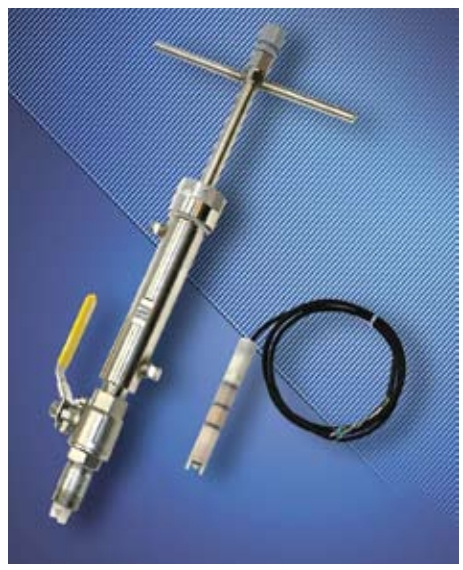


ABB Instrumentation announced the Endura TBX587 retractable pH sensor. The sensor targets smaller 1-in. NPT process connections found in sample lines in refineries, chemical plants and other industrial applications. The temperature compensation element provides response times said to be up to 6x faster than conventional gel-filled pH sensors.
www.abb.com

Pulse rate emitter

Cal Sensors has launched PIRE-Plus, a pulse rate emitter that can be pulsed as a source of blackbody radiation for near-to-far infrared applications at 180 Hz with 50% modulation depth. With a pulsing speed 18x faster than alternative technologies, the emitter is said to maximize signal-to-noise performance, expanding the measurement dynamic range and resolution for trace gases with very low parts per million. The solid state emitter offers an output of 4 x 10^{-2} W/cm^2 at 1 in. from filament and it includes integrated drive electronics.
www.calsensors.com

USB analog output modules

ACCES I/O Products has announced the USB-AO series. The USB-AO16-16A model features USB 2.0, a multifunction board with 16 channels of 16-bit resolution analog outputs along with two 16-bit analog inputs and 16 digital I/O lines. The module can be used in a PC or embedded system with a USB port.
www.accesio.com

Feature: Process Automation

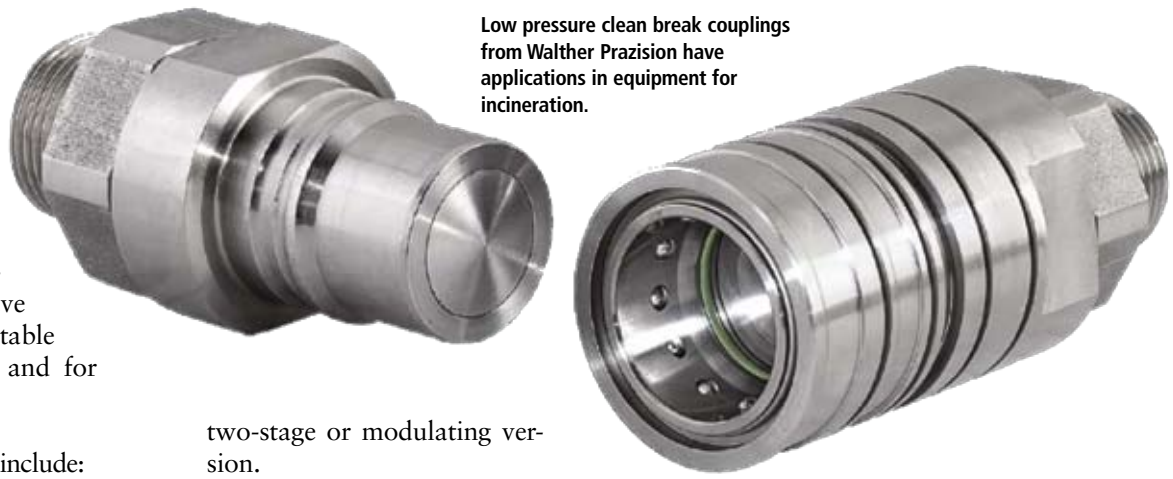
Firing systems in waste-to-energy plants

Operating worldwide, Saacke GmbH of Bremen, Germany, has been active in the field of incinerator equipment for over 75 years. More than 100,000 firing systems for various industrial applications and more than 5000 systems for the heat and steam production on ships and for offshore technology are arguments in favor of the reliability and quality of the systems.

This application involves the couplings used for initial firing in the supply and return lines for fuel oil on the burner of a waste incinerating plant.

In the past, the burners were firmly fixed and piped. Saacke required that the burner is only used for initial firing, after which it has to be quickly removed. This happens 1 to 2 times a month. After that a permanently installed burner takes over the combustion.

The company turned to Walther Prazision (www.walther-couplings.com) for its low pressure clean break coupling CT-012. The units have a nominal bore 12 mm, suitable for the required pressure and for fuel oil.



Low pressure clean break couplings from Walther Prazision have applications in equipment for incineration.

Benefits of the CT-012 unit include:

- Short set-up times = high availability or main system = cost efficiency
- No leakage = high safety standard = cost saving/no accidents
- Supply and return lines can be mounted non-interchangeably (adaptor/coupling – coupling/adaptor) = short set up time and high safety = cost saving operation.

The self-sealing, clean break units can be connected under residual pressure of 8 bar/116 psi. They also can connected with one hand operation, but two hands are recommended for decoupling.

Maximum working pressure (connected) is 64/928 bar/psi, with a maximum working pressure (disconnected) of 30/435 bar/psi.

The Saacke Eurotherm burner (shown) using the CT-012 is a low NOx burner of monoblock construction, i.e. the fan is integrated into the burner itself. The product line contains light fuel oil burners, gas burners and dual-fuel burners for light fuel oil and gas. Depending upon the capacity range, Eurotherm burners are available in the two-stage or modulating version.

The burner is available with variable burner head geometries and internal or external burner control with mechanical or electronic compound. The monoblock burners are also available with safety and control devices.

For any operating point, the combustion air flow is smoothly micro-adjusted by means of the stabilizing disk that may be moved according to capacity. Since the fuel-air mixture is optimally adjusted, the combustion efficiency is considerably improved. By this, fuel consumption can be reduced. Oil operation is enhanced by the use of a centrally positioned oil return nozzle. This special design and the low NOx technology minimize emission rates and thus advance environmental protection.

The monoblock burners are modularly constructed. Maintenance as well as installation of complete function groups therefore is very fast and easy. Well-established and standardized components such as those from Walther Prazision reduce stock keeping of spare parts, allow for fast servicing and guarantee high lifetime and operational reliability. Set points positioned wherever necessary support efficient adjustment. Due to the use of fail-safe plug connections, components like gas trains can easily be electrically connected. The burners are completely pre-wired and mechanically pre-adjusted which guarantees fast and easy commissioning, Saacke says.

Saacke Eurotherm burner ready for shipping. The couplings are packed to prevent contamination.

This article was contributed by Spez-Tech Engineered Fluid Power Technology of Mississauga, ON.
www.speztech.com

CAD Industry Watch

Autodesk Inventor 2011 moves beyond just parametric modeling

By Bill Fane

Recently about two dozen journalists from around the world were invited to the Autodesk Manufacturing Day at its headquarters in Lake Oswego, OR (near Portland) for the roll-out the latest releases of software products related to manufacturing.

The Autodesk Manufacturing Group started with Inventor (www.autodesk.com/inventor) but it has grown to include something like 40 related products, many by acquisition. The big push at Manufacturing Day was the increasing interoperability between these products.

Fusion out of the "Labs" to "out of the box"

Probably the first thing to catch your eye in Inventor 2011 is literally the first thing to catch your eye. Inventor now supports ten different visual styles, ranging from Realistic through to Illustration.

Realistic is a high-quality rendered style including shadows and reflections. Illustration simulates a hand-drawn pencil sketch.

Personally I find that there is something ironic in spending thousands of dollars on hardware and software to emulate a loonie or toonie for a pad of paper and a pencil…

Anyway, the really big news here is that these are not static rendered modes. You can continue to design, edit, pan, zoom, and orbit in every mode. In addition, all Autodesk products that support materials and textures all use the same material library.

This means that you can move a 3D model between applications and it will still look exactly the same. The various realistic and shaded modes can be useful when working on a complex assembly, or when working on something where final appearance is important.

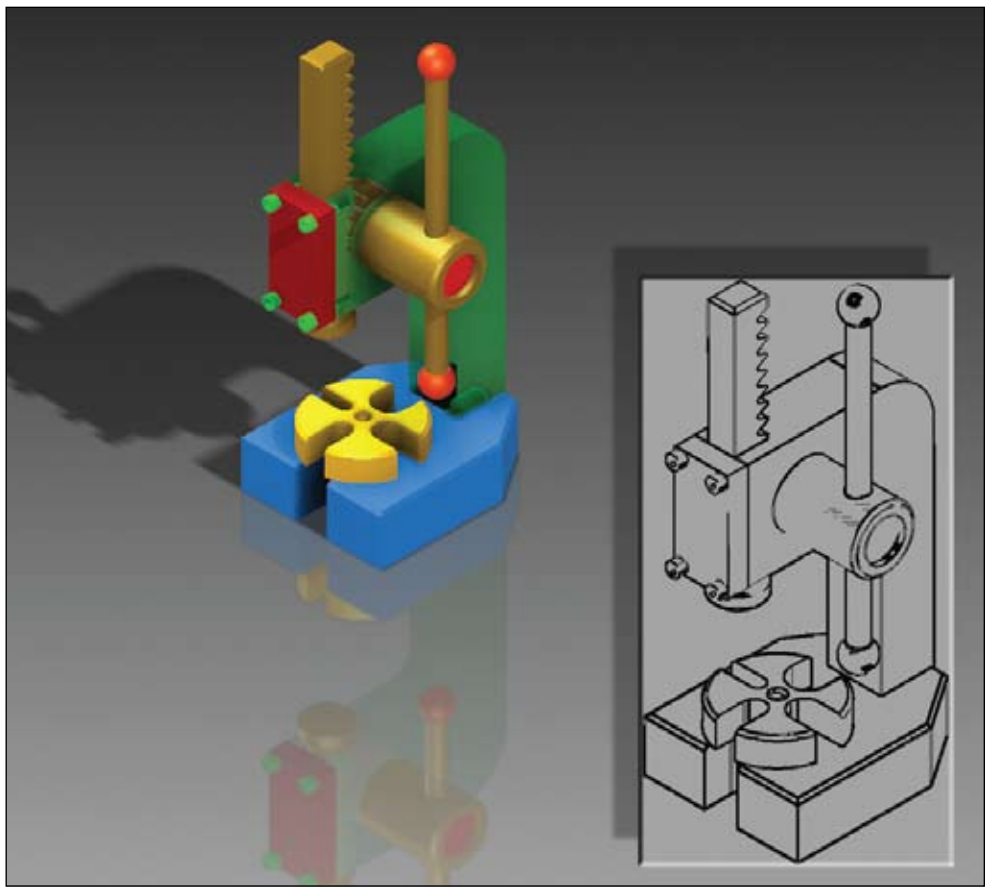
There are two significant new features related to assembly constraints. The first is that Mate and Angle constraints are not confined to having a single offset value. You can specify a low, nominal, and high value for constraints, and the user can use their mouse to drag the component back and forth between the limits.

I can foresee that in many cases this will replace the Contact Sensor because it seems to be much faster and more robust. It is often possible to confuse the Contact Sensor in a large, complex assembly by moving things too quickly. Another reason it will probably replace the Contact Sensor is because the Contact Sensor switch is now buried four picks down in the ribbon instead of being one level down in the menu, and so users won't even realize that it is there.

The other significant new feature related to assembly constraints is the fact that you don't even need to apply constraints directly any more. When the new Assemble command is active you simply select geometry on the first component, then on the second. The first component moves to the second and a suitable constraint is applied.

At first it seems to have a few little idiosyncrasies, but once you figure out the actions of its mini-toolbar it is actually faster and more intuitive to use than applying constraints the traditional way.

Autodesk have had a module for Inventor called iLogic available on the Autodesk Labs web site for some time now. With it, you can program complex relationships including nested If-Then-Else functions into parameters and models.



Realistic is a high-quality rendered style including shadows and reflections. Inset: Illustration simulates a hand-drawn pencil sketch.

For example, the existence of a feature can be turned on and off based on the value of a parameter. This means that a part gains an extra strengthening rib if the size of the part exceeds a certain value. iLogic is now included in Inventor 2011.

There has been much debate recently over whether history-based or explicit modeling is better. History-based, such as Inventor, allows parametrics while explicit, such as AutoCAD's 3D capabilities, make it easier to directly manipulate features and faces on the model.

Now you can have it both ways. Autodesk have had a program called Fusion available on the Autodesk Labs web site for some time now. With it, you can open a parametric history-based Inventor model and manipulate it like an explicit model. When you are finished it reverts back to being history-based, but has incorporated your edits. Inventor 2011 includes Fusion "out of the box."

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

Hewlett-Packard rolls out new high-end hardware

Hewlett-Packard (www.hp.ca) recently hosted the roll-out of its new high-end engineering workstations and large-format printers in Santa Monica, CA, and was attended by about 100 technical journalists from around the world.

The big news in the workstation department came from Terry Pilsner, VP of Global Workstations R&D. Instead of entering from one side of the stage he made a grand entrance down the centre aisle, carrying a mini-tower workstation which he placed on a pedestal.

He explained that the real significance of the new model was what was contained inside it. Pilsner then opened the case and, like a magician pulling a rabbit out of a hat, he extracted the new Z200 SFF (Small-Form-Factor) workstation.

Terry Pilsner, VP of Global Workstations R&D at HP compares new workstation footprint compared to tower model.

That's right; the Z200 SFF has pretty much the same specifications as the standard Z200 but occupies about one-third of the volume. HP anticipates that there will be a large market for it in Asia and in Europe, where office space tends to be at more of a premium.

Other workstation news included the release of the new EliteBook 8740w Mobile Workstation, which HP describes as the most powerful laptop is has ever produced (so far). The unit can be fitted with as much as 16 GB of system RAM and 1 GB of video RAM.

HP works very closely with Intel. As you may have noticed, processor speed has pretty much topped out at about 3 GHz. You can exceed the posted speed limit in your car by simply pressing the accelerator a little further down, but CPU speeds have bumped up against laws of physics. They are a little harder to violate.

The solution is much like adding extra lanes to a freeway to reduce traffic congestion. Individual cars don't go any faster, but you do move more cars per hour. In computers, this is accomplished by putting more computing cores on the same CPU chip, and by putting several CPUs in the machine.

Individually, they can't go any faster but working in parallel they can accomplish more in total. The HP Z-series workstations are now available with the latest Intel Xeon CPUs with as many as twelve cores in one machine.

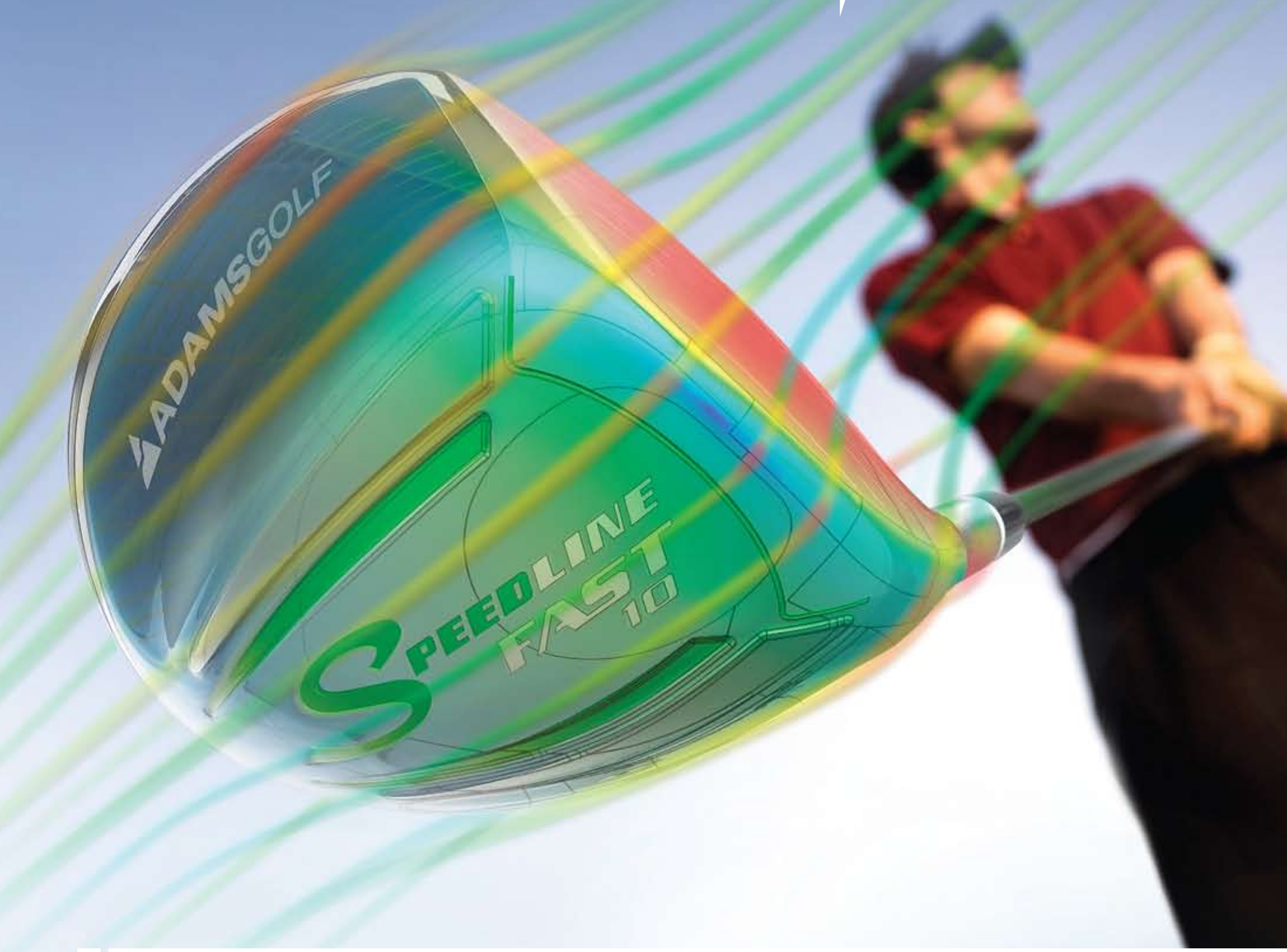
HP also introduced several new large-format printers at this event, aimed at smaller print service providers (PSP) and larger in-house departments.

At the upper end of the range, the Designjet Z6100 is available in 44 and 60 in. widths and can produce over 1000 square feet per hour on plain paper. Print resolution can be as high as 2400 x 1200 optimized dots per inch.

The new Designjet L25500 series is also available in 42 and 60 in. widths. It uses HP Latex Printing Technologies to produce signs and banners for outdoor use.

Disclosure: HP provided air travel, hotel accommodation, and meals. Unfortunately, they didn't hand out any free samples.

How do you make a driver that's better than bigger?



The answer for Adams Golf: Optimize the driver to swing faster with PLM Software..

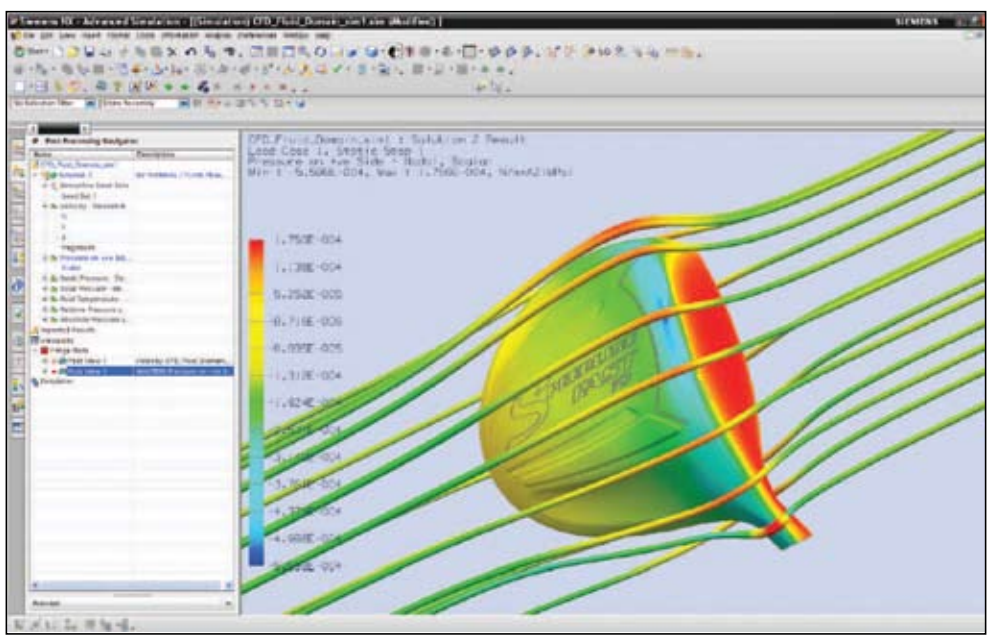
Adams Golf® discovered that club head size is just one factor in improving driving distances. The other is increasing club head speed. The company used Siemens PLM software to reduce aerodynamic drag on its new Speedline™ FAST 10 driver by 10 percent. Not only did Adams optimize the club to swing faster, the company brought it to market faster. See the story of the Speedline FAST 10 driver at **www.siemens.com/plm/adams.**

Answers for Industry.

SIEMENS

Feature: CAD

CAD, CAE allow golf club designer to grab market share



Visualization of streamlines and club face pressure distribution using NX Flow.

Adams Golf designs, assembles, markets and distributes premium-quality, technologically-innovative golf clubs.

All of the equipment at Adams Golf is designed and tested using a variety of sophisticated, state-of-the-art tools, such as 3D CAD and rendering, CAE, advanced mass property analysis and equipment durability testing.

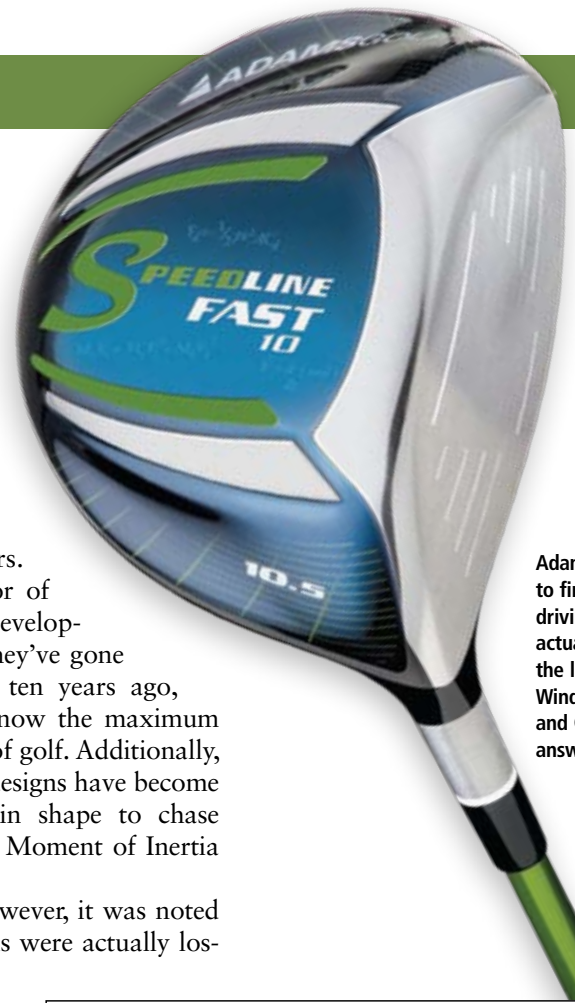
"I don't care if you're a tour player, I don't care if you're the weekend warrior or a beginner," says Tim Reed, vice president of research and development, Adams Golf. "The first thing you want is distance."

In an effort to increase distance and make the club more forgiving, golf club manufacturers have progressively increased driver head size over the years. Scott Burnett, director of advanced product development, points out, "They've gone from 250 cc maybe ten years ago, to 460 cc, which is now the maximum allowed by the rules of golf. Additionally, the driver club head designs have become 'extreme-dimension' in shape to chase the USGA maximum Moment of Inertia (MOI) limit."

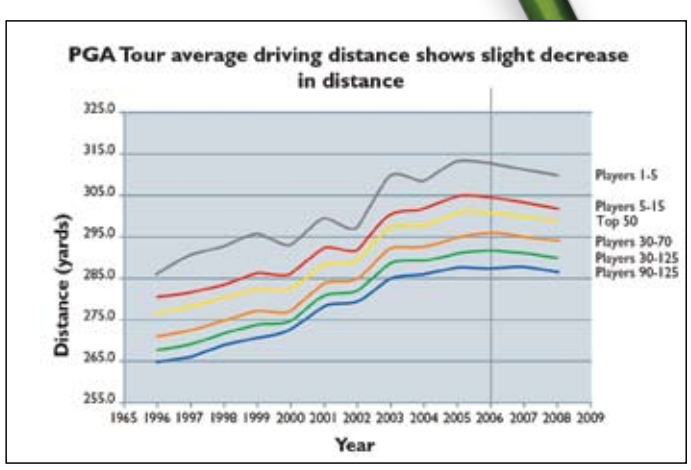
In recent years, however, it was noted that tour professionals were actually losing distance.

Jeff Albertsen, design engineer, Adams Golf, recalls, "We've seen driving distances actually decrease over the last couple years.

I think the trigger was driving distance on the PGA Tour, because those are obviously the best players in the world. We decided to test: Why is this happening? Why are these distances decreasing?"



Adams Golf wanted to find a reason why driving distances actually decreased over the last couple of years. Wind tunnel testing and CFD provided the answers.



Trends in PGA Tour driving distances.

Through player testing, aerodynamic wind tunnel testing and computational fluid dynamics (CFD), Adams Golf identified that large MOI club heads (at or near 460 cc) are subject to aerodynamic forces large enough to impact club head speed. More specifically, Adams Golf found that the reduction in club head speed measured during player tests correlates strongly with the resulting increase in aerodynamic drag for extreme dimension club heads.

Adams Golf applied this knowledge to product development, resulting in the 2009 release of its Speedline driver – a large dimension and high inertia driver with low aerodynamic drag. The Speedline driver displays aerodynamic characteristics similar to smaller club heads. That means reduced drag forces, enabling increased club head speeds and greater distance for all golfers.

"We have to have new technology and new aspects to the product in almost every product we launch," says Burnett. Having already developed the industry's first driver to be engineered using wind tunnel technology for superior aerodynamics, Adams wanted to follow with a product that was even better.

One of the features of the original Speedline driver was the smaller face area which helped reduce aerodynamic drag. For the next generation Speedline driver, Adams wanted to increase the face area to improve impact efficiency while delivering even higher club speeds – a very challenging proposition.

Relying purely on experimental methods such as wind tunnel testing or player club head speed testing is costly and time-consuming. To achieve the optimal solution that satisfies these competing objectives in a timely manner, Adams decided to use NX Flow software in its process for designing driver heads. "We were already using the (NX) design software… so it fit very well," said Burnett.

In fact, Adams Golf considers the application and management of its technological resources, including NX product development software, as critical to its innovation and success. Burnett added, "We've used NX Flow to develop the last couple of products. It's pretty much an integral part of the design process for driver heads now."

"The typical manufacturing process for us – from conception to seeing actual prototype parts – is anywhere from 30 to 60 days," said Jeff Albertsen, design engineer, Adams Golf. "Now using the NX Flow software, we can design, test the design, validate that it's going to work and actually have a real-time working concept in probably less than 20 days. So by using the NX software, we can cut down on manufacturing lead times, we can cut down on manufacturing costs, we can cut down on testing times."

> "We have to have new technology and new aspects to the product in almost every product we launch"

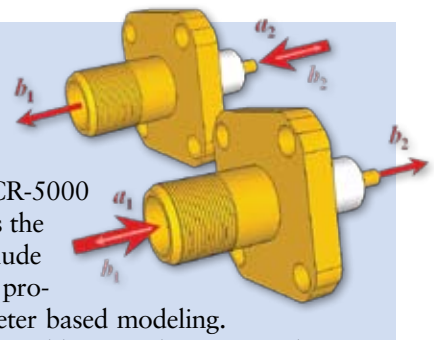
Reed concluded, "The role NX ultimately plays is speed to market, providing us extraordinary flexibility and adaptability to the ever-changing environment of the golf industry."

This article was contributed Siemens PLM Software.

www.siemens.com/nx

CAD Chronicle

S-Parameter support for SI analysis

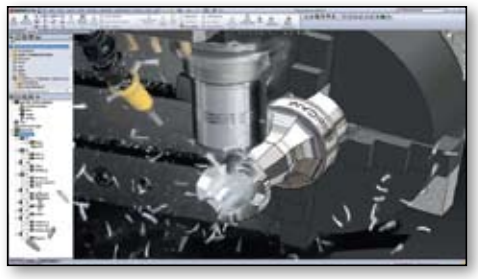


Zuken has announced the support of S-Parameter based circuit models within the latest version of its high-speed design and verification environment, CR-5000 Lightning revision 12.0. This enhancement extends the capabilities of SI (signal integrity) simulation to include a range of new application areas and simplifies the process for layout engineers unfamiliar with S-Parameter based modeling. The SI analysis within CR-5000 Lightning is performed by time-domain simulation that works in conjunction with design capture and physical layout.
www.zuken.com/cr-5000-lightning

Maxon adds free 3D models to TraceParts

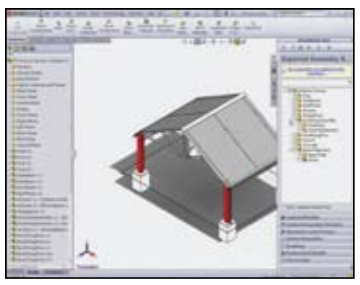
Maxon Motor has added 3D solid models to the **TraceParts** download site. Maxon provides dc motors with ironless rotors, brushless dc motors, planetary, spur and harmonic gears, as well as high-resolution digital encoders, dc tachometers and resolvers. Models are available in a wide variety of free 3D solid model formats, as well as in 2D drawing formats. These include AutoCAD, Inventor, CATIA, Pro/ENGINEER, Alibre Design, SolidWorks, Solid Edge and TopSolid.
www.tracepartsonline.net

SolidCAM enhances look



The new version **SolidCAM** 2010 SP0 is now ready for download. In this version the SolidWorks "look-and-feel" has been enhanced by adding new ribbons and unifying the various icon sets of the CAM views. In addition, the level of associativity has been further raised by including now also picked points and all points of vertex, edge, face, sketchpoint and sketch segments. SolidCAM 2010 enables more efficient use of process templates, as the geometry, upper level and lower level parameters are now common for all operations of the process template. Also, templates can now be filtered according to attributes.
www.solidcam.com

DriveWorks Pro Sales Configurator

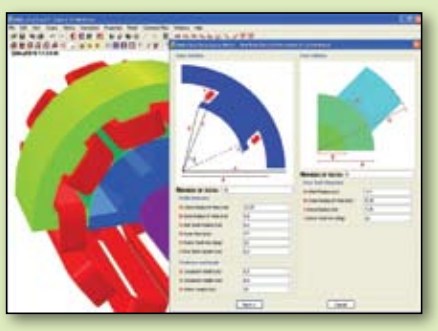


The latest release of **DriveWorks** Pro is said to ensure that companies that design- and engineer-to-order can also offer their customers and distributors a fast online experience. With DriveWorks Pro there is an easy upgrade path all the way from DriveWorksXpress, (included in every seat of SolidWorks) to the online module of DriveWorks Pro allowing users to design and configure products via the web. Major enhancements cover speed and performance, integration with SolidWorks, specification flow, and web experience.
www.driveworkspro.com

Planning workflows

Tecnomatix 9.1, digital manufacturing software that includes new planning workflows and capabilities supporting multiple industries. Integration with the Teamcenter PLM platform means that many Tecnomatix capabilities can be launched and/or controlled using the familiar Teamcenter environment. Other enhancement areas include: automotive body-in-white planning, cross-industry quality management, assembly planning, and digital human modeling for China and around the world.
www.siemens.com/tecnomatix

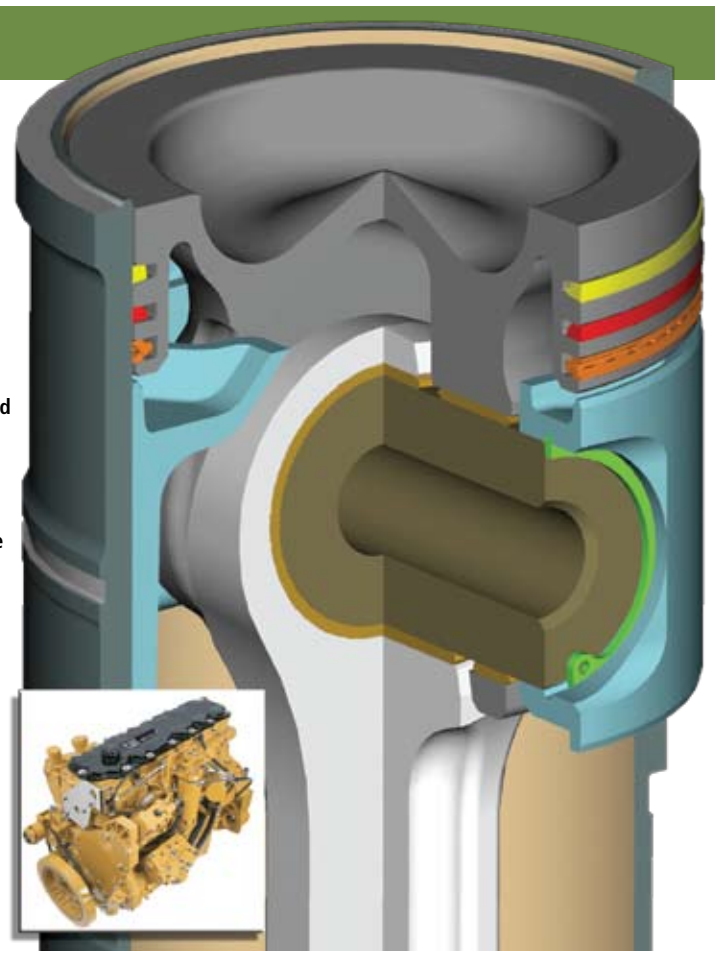
Electromagnetic design



Cobham Technical Services is launching a 3D version of its rapid electromagnetic design tool for rotating electrical machines – the Advanced Machines Environment. The software combines the accuracy of finite-element analysis simulation with a design entry system that creates 3D models of electric motors or generators within minutes. The software is an application-specific toolbox of the Opera electromagnetic simulator.
www.cobham.com/technicalservices

Feature: CAD

Caterpillar predicts fatigue life from measured strain data



Caterpillar (inset, engine) found that safe4fatigue accurately predicted fatigue life from strain gauge data, and proved to be a useful complement to fe-safe and its other predictive and test methods for product design.

Caterpillar is the foremost manufacturer of medium-speed engines and a leader for high-speed diesel engines, ranging from 50 to 20,000 hp.

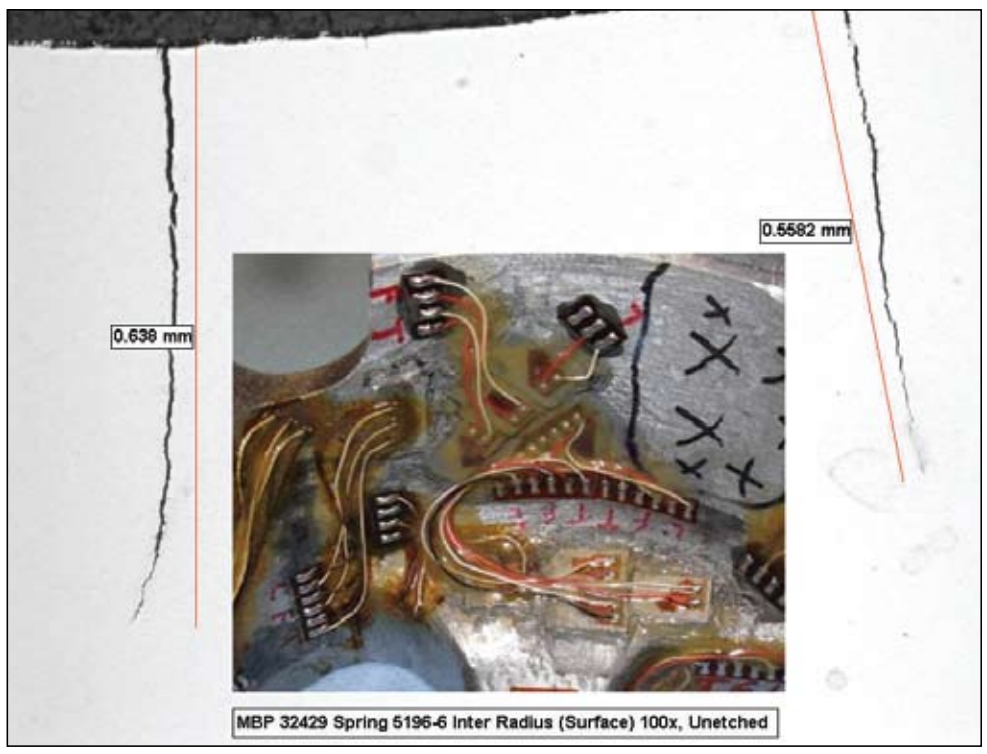
The new-design process at Caterpillar is heavily computer-aided, with an integrated CAD and FEA process since the early 1990s. In 2002, Caterpillar selected Safe Technology's fe-safe software for fatigue life prediction and it is now an integral part of their overall design process. In addition, Caterpillar employs a number of other methods to improve and support existing designs in the field.

An example of this involved a piston experiencing a few field failures somewhat earlier than anticipated. The original fatigue prediction for this component had only involved hand calculations. This was a good opportunity to use a test-based process with Safe Technology's safe4fatigue, measuring strains to predict fatigue life.

Lab engineers arranged instruments around the piston skirt with rosette gauges at three locations. Signals were measured corresponding to the three components of strain.

The test-loading of a piston is complex, due to the various stages of the internal combustion process. A load cycle consists of two complete revolutions of the crankshaft. As the piston is loaded and unloaded, each strain gauge produces three signals. The signals are then processed by safe4fatigue to create valid strain histories.

The measured strain approach has the valuable advantage that strains directly reflect the physical hardware and actual loading; whereas the accuracy of the finite element approach entails careful application of loads and consideration of the mesh density near the areas of high strain.



Sensors inside a piston provided three components of strain around the "combustion" event.

Material properties add complexity to accurate fatigue assessment and prediction. The piston skirt is made of proprietary cast aluminum, which exhibits behavior "somewhere in-between" brittle and ductile behavior. In order to consider situations for both material types, Caterpillar assessed the fatigue life in safe4fatigue using both maximum principal stress algorithm (based on NASA MSFC-388 S-N curve data) and Brown-Miller method (based on material data from an ASM book).

The former algorithm is appropriate for brittle material while the latter one (Brown-Miller) is more appropriate for ductile material.

The effect of mean stress correction was also investigated using three different methods – Goodman correction, the traditional hand calculation method and a mean stress correction curve for cast AISI material. In addition, the effect of surface finish was also considered in the safe4fatigue calculations.

The minimum life was predicted by safe4fatigue at the notch area of the piston skirt. This correlated with field observations. Using the maximum principal stress method, life was predicted at ~1.3 million cycles; the Brown-Miller method predicted ~1.6 million cycles until failure. In areas of high compressive stress – which is the case at the notch – the effect of mean stress was considerable. The hand calculation, which used a default mean stress correction curve, had predicted a fatigue life at the notch of more than 2.5x the life predicted by safe4fatigue, which used a more accurate mean stress correction.

Considering the effect of surface finish also proved vital. Fatigue life decreased about 60% between "polished" (Ra<0.25 µm) and "as-cast" (Ra~30µm) surface finishes (the polished surface has the higher fatigue life).

Overall, Caterpillar found that safe4fatigue accurately predicted fatigue life from strain gauge data, and proved to be a useful complement to fe-safe and its other predictive and test methods for product design.

This article was contributed by Safe Technology.
www.safetechnology.com

Feature: Power Transmission

Factors to consider when choosing a crossed roller bearing

Rollers in a resin cage can be closer together.

Crossed roller bearings or slides work like ball bearing slides, except the bearings housed within the carriage are cylinder-shaped. The rollers crisscross each other at a 90° angle and move between the two parallel guides. The rollers are between "V" grooved bearing ways or raceways ground out of the guides.

Roller-to-rail contact is key to determining load capacity. Of course, rollers provide a larger contact area than ball bearings and, since the rollers usually do not recirculate they are all carrying the load, which produces greater rigidity as well as higher load capacity than ball bearings.

Load capacity correlates with contact area. So, the amount of space between the rollers is a major factor, making as much as a 250% difference.

Metal and resin cages hold the rollers in completely different ways. Metal cages hold the rollers via a notch on the top and on the bottom of the rollers. However, the resin retainer fits around the roller.

Rollers in a resin cage can be closer together. A resin cage can afford at least a 30 to 58% increase of the contact area as compared to a metal cage.

Metal cages are less expensive and can be all stainless or steel. Therefore they can be used in high temperature or medical applications where there is a lot of water and rust potential. Also, resin can have out-gas – causing problems in high vacuum environments.

With crossed roller bearings, the whole rail assembly has to be twice as long as the stroke. That's because the rails move in opposite directions. (However, a few crossed roller linear guide products have recirculating crossed rollers that are not criss-crossed – having four circulations with opposite roller orientations.)

With a resin cage, stroke length on a given length rail can be longer because the cage can be shorter for a given load. Because there is little or no difference between static and dynamic frictional resistances – perfect for minute motion – even under low-load conditions.

For motion control applications with extremely fast acceleration and deceleration (at dimensions ranging from 30 to 600 mm lengths, 2 to 12 mm rollers) endurance can be 150 million cycles.

The crossed roller is less forgiving of mounting surface inaccuracies because of the linear bearing's rigidity and the way that they are designed. Often the bearings can be specified with mounting tables hone to exacting standards such as ultra precision, where 2 microns is the maximum allowable deflection.

A cage prevents the wear of ball to ball or roller to roller contact. Whether metal, resin or some other material, the cage alters, somewhat, a crossed roller bearing's dimensions. Also affecting interchangeability is the design of stoppers as well as the anti-creep mechanism. External anti-creep mechanisms often obviate interchangeability. Internal mechanisms are much more accommodating.

The term "anti-creep" is used to describe the method of eliminating any slippage of the retainer holding the crossed rollers between the two V-grooved rails of the slideway.

Anti-creep devices include rack and pinion mechanism; an external attachment made of plastic gears outside of the rail; and a metal gear inside of the rail. Some are quite expensive.

There is one anti-cage creep mechanism, the Studroller (patent pending) that uses a roller with round balls studded around its surface. By placing studs in the centre roller and machining a path along the rail, this retainer will never slip.

This article was contributed by NB Corporation.
www.nbcorporation.com

Products: Adhesives & Fasteners

E-conductive adhesive

Henkel has developed Hysol Eccobond CA3556HF, a silver-filled electrically conductive adhesive designed to offer fast cure at low temperature. The material is suitable for high-throughput production processes and applications that dictate high peel strength, such as the assembly of photovoltaic (PV) modules, automotive sensors and membrane switches that incorporate temperature-sensitive substrates. Benefits are said to include high peel and shear strength, stress minimization properties to compensate for CTE mismatches, fast cure for high throughput, and a no-mix, one-part formula which reduces operator error and speeds processing time.
www.henkel.com/electronics

Nuts pass vibration test

Hard Lock nuts passed the American Vibration and Impact Test NAS 3350/NAS 3354 and outlasted nylon nuts, nuts with tongued washers, double nuts and other specialty lock nuts by up to 3x. They also retained their grip longer than competitor versions in Junker Horizontal Screw Looseness Tests, which features a self-locking effect even if the nut is not fully tightened. Units require only a wrench to install and are reusable.
www.hardlocknut.com

Swivel lifting eye bolts

Swivel lifting eye bolts from J.W. Winco are RoHS compliant and come in metric sizes. The ring is forged in annealed steel with a bright pink powder coated finish that changes color to indicate exposure to high temperatures. The units permit the use of smaller mounting bolts than required for DIN 580 lifting eye bolts, and are mounted in a bearing and can be rotated. The cap screw cannot be removed from the ring.
www.jwwinco.com

Akron unveils new website

Akron Coatings and Adhesives recently updated its website, allowing visitors to search for products by industry, download product specifications, and access material data safety sheets. As well as product information, the new website features short technical stories on various aspects of adhesive and coating technology.
www.akroncoating.com

Hinge pins for ejector clips

Spirol has introduced a hinge pin designed for PC board card locks and ejector clips which uses the unique spiral spring concept. The hinge features low insertion force and compression of the pin during and after installation. The series 880 Coiled Spring Pin is manufactured from austenitic stainless steel with an oil free finish, making it compatible with plastic handles. The pin's construction makes it suitable for manual or automatic installation.
www.spirol.com

Self-clinching pins

PEM Type MPP micro pins are available with diameters as small as 1 mm/.040 in. and in lengths as short as 2 mm/.080 in. The pins can be installed permanently into stainless steel or other sheet materials as thin as 0.5 mm/.020 in. with hardness up to HRB 92 (Rockwell "B" scale) or up to HB 195 (Brinell). The product is RoHS-compliant and manufactured from precipitation-hardened stainless steel.
www.pemnet.com

Feature: Adhesives & Fasteners

Slotted pin inflexibility leads to failure

By Jonathan Higgins

A "spring pin" is appropriately named by its ability to flex into a hole that is smaller than the pin's original (pre-installed) outside diameter. A spring pin's tendency to return to its original shape after installation makes the pin self retaining. Retention is established by friction between the pin and host wall and not by deformation as with alternative solid press fit pins. In general, this concept of preserving joining components (both pin and host) during installation increases the life of dynamic assemblies.

The term spring pin commonly describes both coiled pins and slotted pins. While the concept and naming of coiled pins and slotted pins may be interchangeable, there are distinct differences between the two pins.

The coiled pin saved on piece price, assembly costs, warranty claims and enhanced safety

As a slotted pin is installed, the pin's "spring like" characteristic is reduced to a narrow seam opposite to the slot. Here, stress concentrations form as a result of the pin's limited flexibility. This portion of the slotted pin is susceptible to failure if the pin is subject to impact loads.

A second mode of failure is caused by the slotted pin's rigidity after installation. When a slotted pin is installed, the slot closes and the pin can act like a rigid hollow tube. This tube behaves similarly to a solid pin. As a solid member, impact loads are transmitted to the host wall; causing hole elongation. As the hole load and size increases, impact loads intensify, and failure is accelerated. The pin cracks, falls out of the hole, or does both.

The solution to these problems is Spirol's coiled pin. As the coiled pin is installed, stress is distributed throughout the fastener instead of being concentrated along a line. The coiled pin's design also ensures flexibility after installation. For the life of the assembly, the coiled pin is able to absorb impact loads without causing damage to the host or the pin. Unlike the slotted pin, it remains an active member of the joint, continuously absorbing loads.

Exemplifying the differences between the coiled pin and the slotted pin in demanding, high-impact applications, the following case study could apply to many similar applications.

A quick coupler manufacturer was challenged to design a stop feature that could withstand high impact loads for construction site excavators. The coupler requires a positive stop to control the stroke of the hydraulic lever each time an attachment is released. In the coupler shown Illustration 1, the manufacturer used a slotted pin as the stop mechanism. The crack shown in the inset picture is a result of the slotted pin's limited flexibility.

Because the slotted pin is not able to easily conform to the hole size, it folds and creates a limited interference fit at 3 points to the hole. This causes stress to concentrate 180° from the slot. Over time, this weak area was exacerbated by impact loads, leading to failure. The slotted pin was at risk to fall out of the hole and the productivity and safety of the construction site was compromised.

In an attempt to correct this issue, the manufacturer inserted a second slotted pin into the first, called composite pinning. While the result is a stronger, more rigid pin, problems normally arise with this configuration.

Initially, in this application, the composite pin was able to withstand more cycles, but, over time, the same cracking problem occurred. Stress concentrations that were inherent to the slotted pin's design continued to cause failure opposite to the seam. This more expensive and cumbersome design was only a short term solution.

The coupler manufacturer contacted Spirol for assistance. Spirol's Application Engineering Team reviewed the coupler design and the manufacturer's performance objectives. A heavy duty coiled pin was recommended for the pin's unique combination of strength and flexibility.

The heavy duty coiled pin is progressively rolled with thinner gauge strip (see Illustration 2), yet the additional cross sectional material achieves greater strength than the slotted pin. This creates a strong pin with increased flexibility, making the pin able to withstand impact loads and provide long-term joint integrity.

There is no single point of stress concentration, and the hole size is preserved.

The coiled pin saved the customer on piece price, assembly costs and reduced warranty claims. It also enhanced workplace safety.

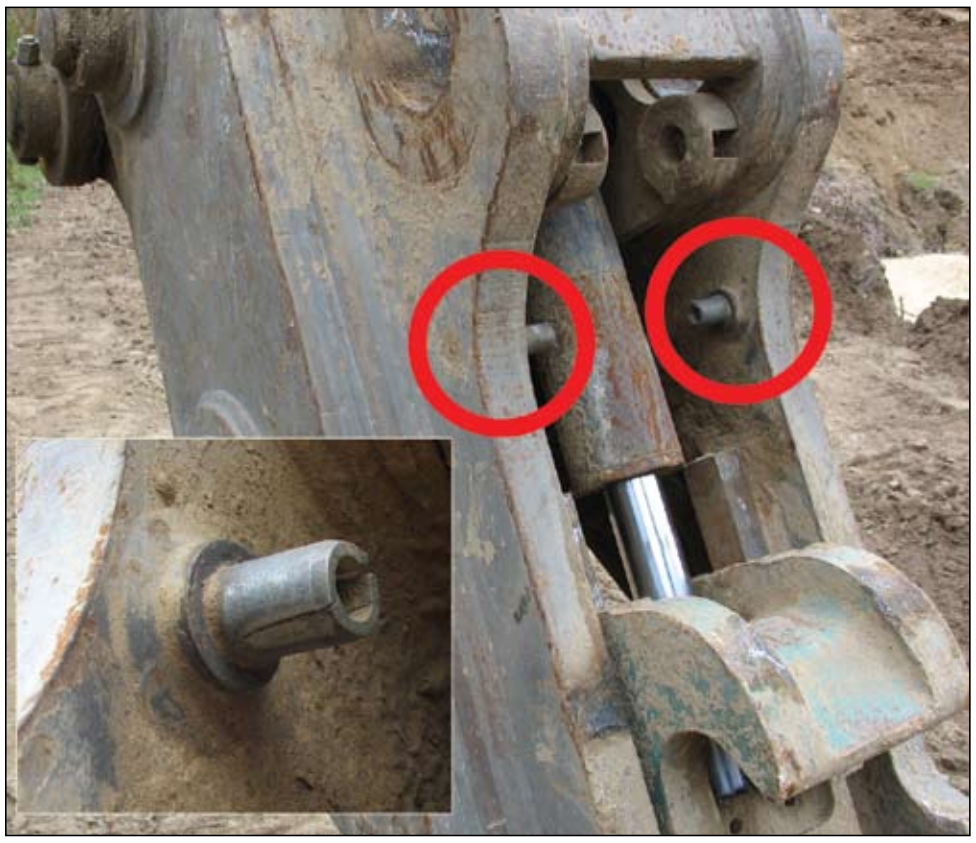
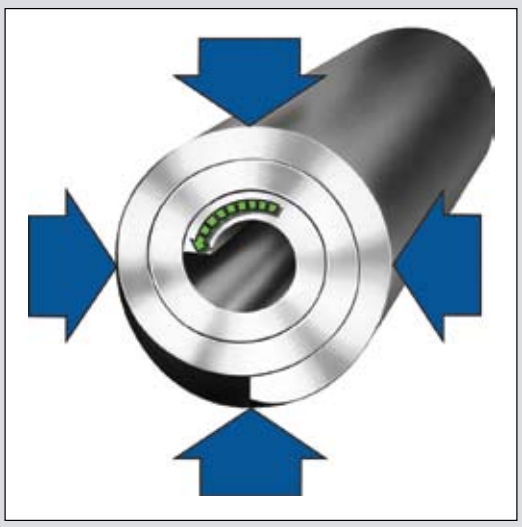


Illustration 1: In the coupler shown, the manufacturer used a slotted pin as the stop mechanism. The crack shown in the inset picture is a result of the slotted pin's limited flexibility.



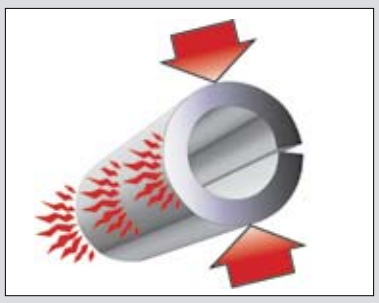


Illustration 2: The heavy duty coiled pin (left) is progressively rolled with thinner gauge strip, yet the additional cross sectional material achieves greater strength than the slotted pin. Above: a traditional slotted pin showing stress concentrations as a result of the pin's limited flexibility.

Jonathan Higgins is Field Applications Engineer, Spirol International Corp. Spirol offers free samples and free engineering support
www.spirol.com

Spotlight

Motion Control

Continuous duty stepper

Oriental Motor USA has announced PKE stepping motors that can be driven at continuous duty cycles. The motor is available with a motor frame size of 1.65 in.2 and three stack lengths of 1.3, 1.54 and 1.85 in. Output torque from the different models ranges from 34 to 77.8 oz in. Shaft speeds in excess 2000 rpm can be achieved with a 24 Vdc driver.
www.orientalmotor.com

Geared brushless dc motors

Crouzet North America has introduced geared BLDC motors. Motors include continuous power up to 400 W, speeds between 1500 and 6100 rpm, and motor constants up to 15 oz/square root W. Maximum torque constants feature up to 198 oz in. The BDE30 and BDE40 external drives are offered in 6 or 14 A max respectively.
www.crouzet.com

Rod-type electric actuator

Bimba has introduced its first rod-type electric actuator, the Original Line Electric (OLE). OLE actuators have a wide variety of options, are available with and without motor and drivers, and feature thrusts up to 350 lb, speeds up to 20 inches per second and strokes up to 18 in. Standard actuators mount to a wide variety of steppers and servos.
www.bimba.com

Lean automation packs

Omron Industrial Automation announced Lean Automation Packs that provide integrated, pre-engineered control for small machines that are said to cut design and installation time by 50% compared to components sourced from separate suppliers. Each pack handles either speed control with an ac drive (inverter) or position control with a servo drive and motor.
www.omron247.com

Magnetic encoders

Pepperl+Fuchs has introduced MNI40 incremental rotary encoders. The magnetic, non-contact encoder has intelligent diagnostics suitable for a wide range of applications. The unit delivers resolution up to 3600 ppr at speeds up to 30,000 rev/min and operating temperatures from -40° to 100°C. Features include indication via LED display.
www.pepperl-fuchs.us

Wind turbine sensors

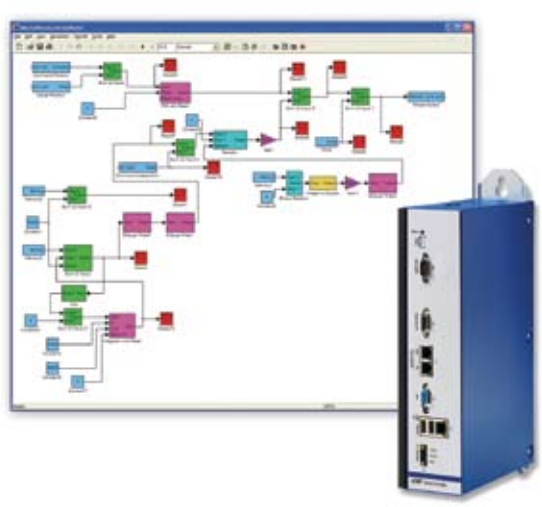
Optipact motion sensors from **Fraba** measure velocity by calculating the rate at which an image of a moving surface travels across an optical sensor. Since there is no contact between the sensor and the moving object, dust or surface contaminates won't cause problems. The sensors help determine rotor speed in wind turbines by measuring the velocity with which part of the rotor (e.g. nose cone or shaft) moves past a point on the body of the turbine.
www.fraba.com

Integrated stepper motors

Applied Motion Products has announced that it has expanded its line of Integrated Step Motors to include CANopen and Ethernet communication versions. The STM unit combines step motor and drive technologies into a single device. Communication options include: RS232, RS485, CANopen, Ethernet and Ethernet/IP. Models are CE marked, and RoHS Compliant.
www.electromate.com

Program helps speed control software design

Kollmorgen has introduced MechaWare 4.0, the upgraded MechaWare version said to leverage MATLAB/Simulink to identically model and integrate mechanical systems and control software design, resulting in faster design cycles. Advantages of MechaWare 4.0 include the ability to eliminate mechanical vibration and reduce settling time, as well as reduce motor cogging with tools to map and compensate for error due to motor cogging.
www.kollmorgen.com



Servo drive provides integrated motion over EtherNet/IP

Rockwell Automation has announced a modular servo drive to leverage embedded EtherNet/IP technology for integrated motion control. When used with the Allen-Bradley ControlLogix programmable automation controller (PAC), the Kinetix 6500 drive is said to help provide increased machine design flexibility, improved system performance and reduced system cost. Integrated motion on Ethernet/IP within the servo drive uses CIP Motion, an extension of CIP.
www.ab.com/motion/

PMDC 56C-frame motors

AutomationDirect IronHorse permanent magnet dc 56C-frame motor line features totally enclosed non-vented (TENV) and totally enclosed fan-cooled (TEFC) models. The motors are available in sizes ranging from .33 to 2 hp. The dc motors, with a base 1800 rpm, are designed for use on unfiltered SCR (Thyristor) type 115 or 230 V rectified ac inputs, when used with an appropriate SCR drive. Units may also be used with pulse width modulated type dc adjustable speed drives.
www.automationdirect.com

Rod-style linear actuators

The **Tolomatic** IMA with the new roller-screw option can exert a force of up to 3300 lb and move a top speed of about 12 ips. The unit is available with a choice of motor voltages in any incremental stroke length from 6 to 18 in. The unit has a patent-pending lead-screw lubrication system that allows for re-lubrication without disassembly.
www.tolomatic.com

Feature: Motion Control

Servo controls deliver benefits for medical imaging systems

By Lee Stephens

Medical imaging technology has rapidly advanced in recent years, increasing the speed and resolution of the images it produces.

A new generation of drives with digital biquadratic filters is enabling servo motors to be successfully applied to imaging gantry applications with inertial load mismatches of up to 1000 to 1 and their associated resonance challenges. The results are more accurate motion profiles and faster acceleration and deceleration, resulting in higher throughput and clearer images.

Open-loop and closed-loop ac induction motors have come to dominate the market for positioning gantries in imaging equipment such as computed tomography (CT), positron emission tomography-computed tomography (PET-CT) scanning and x-ray machines. The high inertia of ac induction motors reduces the mismatch between the motor and the load. However, as medical device manufacturers attempt to improve the throughput and image quality provided by their machines, they are often faced with the inherent performance limitations of these motors.

In many applications that require fast and accurate positioning, induction motors have been replaced by permanent magnet servo motors that provide very high peak and continuous torques resulting in high acceleration and deceleration rates for substantial performance improvements in precision positioning systems. A key advantage of these motors is that torque is directly proportional to input current while speed is linked to input voltage.

Low inertia construction is an inherent design of many permanent magnet servomotors. As a result, large mismatches between the high inertial loads of imaging gantries and the low loads of the motor need to be accounted for. Servomotor control systems can be tuned to handle inertia mismatches, but once tuned, they may respond poorly as the inertia of the load is either increased or decreased. For most medical applications the load rarely changes; however, the belt drives normally used in these devices cause compliance or lost motion between the motor and the load which in turns changes the reflective inertia.

Open-loop and closed-loop ac induction motors have come to dominate the market for positioning gantries in imaging equipment such as computed tomography (CT).

Induction motors vs. servomotors

For servo systems to operate effectively, servo amplifiers need to be tuned to optimize the response of the system. Increasing the response of the system often involves increasing gains. But adding too much gain will lead to instability and sometimes uncontrollable oscillations.

A control system is out of control when the gain is -3 dB or less or the output phase is -45° or less from the control signal, or -135° relative to a reference from the motor. The open-loop transfer function is well known to predict stability problems using two measures: phase margin (PM) and gain margin (GM). PM is the difference of -180° and the phase of the open loop at the frequency where the gain is 0 dB. GM is the negative of the gain of the open loop at the frequency where the phase crosses through -180°. The greater the unpredictability of the load, the higher that GM and PM need to be to ensure the stability of the control system.

For example, when the resonant frequency is well below the first phase crossover (270 Hz) the effect of the compliant load is to reduce the GM. If the inertia mismatch is 5 the reduction of GM will be 6, or about 16 dB.

Assuming no other remedy were available, the gain of the compliantly coupled system would have to be reduced by 16 dB, compared to the rigid system, assuming both would maintain the same GM. Such a large reduction in gain would translate to a system with much poorer command and disturbance response.

Lee Stephens is Senior Motion Control Engineer at Kollmorgen in Radford, VA. A longer version of this article is available at www.dpncanada.com, keyword "Stephens."

www.kollmorgen.com

Medical Engineering

Hall effect puts information at the fingertips

By Mark Sunderland

The paring of existing technologies gives us even more scope and with innovative modification, new devices are created for needs that have been previously inconceivable. The Hall sensor, for example, is a transducer that's been known for more than a century. Now that it can be miniaturized, applications for it have begun to emerge.

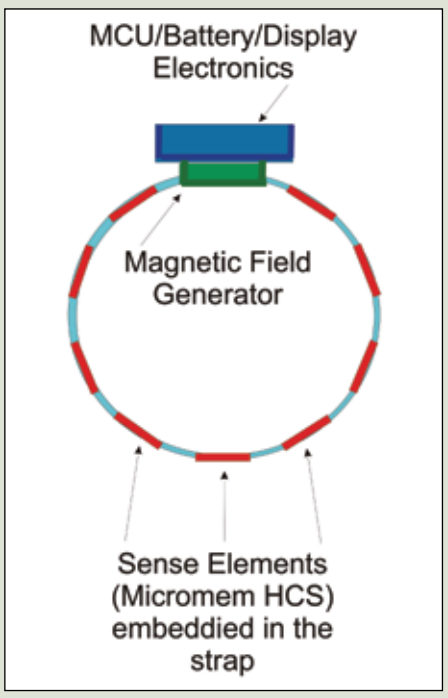
The sensor varies its output voltage in response to changes in a magnetic field. The process is used in proximity switching, positioning, speed detection and current sensing applications.

The Hall sensor is basically a cross that registers whenever a magnetic field strikes it. Depending on which way it is struck, it sends out a zero or a one, and since zeros and ones are the substance of memory the signals are sent into MRAM (magnetoresistive random access memory). The signals are captured and at very low levels they are able to collect the "signature" of the specimen under examination.

Unlike the conventional RAM technologies, MRAM data is not stored as electric charges or current flows, but by magnetic storage elements.

Hall sensors are frequently combined with circuitry that allows a device to act in a digital (on/off) mode. They are commonly seen in industrial applications and they are also used in consumer equipment. Some computer printers use them to detect missing paper and open covers. When high reliability is required, they are also used in keyboards.

The sensor is the key to biometrics – the processes for recognizing individual people based on unique physical and behavioral traits. Physiological biometrics is the class of biometrics that deals with physical characteristics and attributes. Many physical characteristics can be scanned by a biometric sensor including eyes, fingerprints or DNA. The sensors contain an analog-to-digital converter, enabling the image to be stored in digital memory so that it can verify the user and thereafter authenticate the user's identity.



MASTInc's ultra-sensitive sensor technology is pioneering an innovative solution to a global issue known as "Life Watch." Using an array of MASTInc sensors, Life Watch is able to continuously measure the amount of glucose in the bloodstream by identifying its unique magnetic signature.

Behavioral biometrics define the moving parts of a person such as rhythm and gait. The voice is also a physiological trait because every person has a different vocal tract, but voice recognition is mainly based on the study of the way a person speaks, so is commonly classified as behavioral.

With the design of a non invasive sensor for measuring the glucose levels of diabetics, Micromem Applied Sensor Technologies (MASTInc), a subsidiary of Micromem Technologies of Toronto, is taking the experience it gleaned from developing sensors for mineral exploration in the mining industry to make an entry into the medical market.

Continuous monitoring of blood glucose levels is of particular significance due to the dramatically increasing number of Americans developing Type 2 Diabetes each year and the need for more reliable, versatile and non-invasive continuous measurement devices.

MASTInc's (www.mastinc.com) ultra-sensitive sensor technology is pioneering an innovative solution to this global issue known as "Life Watch." Using an array of MASTInc sensors, Life Watch is able to measure the amount of glucose in the bloodstream by identifying its unique magnetic signature.

This same technology can be adapted to identify and measure any micronutrient or substance with a unique magnetic signature within the body, leading to additional applications, including the measurement of Hypoxia – a pathological condition in which the body as a whole or a region of the body is deprived of an adequate oxygen supply.

Beyond their immense value in the health system, biometric sensors and detectors can play an important role in security applications. Personal information is often at risk of infiltration by hackers and frauds – especially when internet transactions are made. By using biometric sensors to control access to financial information, the level of security can be greatly enhanced for both the customer and the financial institution.

New innovations are constantly advancing the field of biometric science and increasing the scope of possible applications. Speech, hearing and memory and, in the tangible sense, feeling are all human attributes that can simulated and recorded for either our good or, perhaps, otherwise.

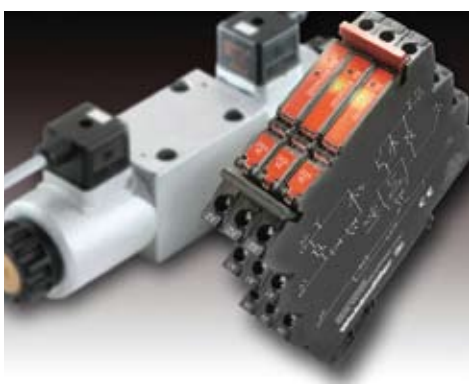
Mark Sunderland is President of Ottawa-based BioMedical Industry Group (mark.sunderland@biomedgroup.com).

Products: Switches

Relays switch from 12 to 80 A

Power Up series relays from Hasco switch 12, 16, 40 or 80 A. Available in both dc and ac coil, the series is said to specialize in small size, low cost and plenty of current (UL 40 & 80 A for electric automotive use). Free samples are available.
www.hascorelays.com

Safety opto-couplers



Weidmuller has expanded its Microopto opto-couplers series to include 4 new versions; solenoid, 1CO, and two TTL devices. The solenoid is designed for safe and reliable control of inductive loads such as solenoid valves and contactors of up to 24 Vdc and 10 A. The 1CO is a high frequency electronic switch that provides an isolated output which can either repeat or invert its input. Two TTL models are designed to convert to and from 5 V TTL signals and higher direct current levels, and standard 24 Vdc.
www.weidmuller.com

Momentary pushbuttons

NKK Switches has announced the MB2400 series of miniature, snap-acting, snap-in mount pushbuttons. Available in single pole or double pole, momentary circuits, engineers can specify gold, silver or gold over silver contacts. The devices are rated at 3 A at 125 Vac with silver contacts, 0.4 VA maximum at 28 V ac/dc with gold contacts or both ratings when gold over silver contacts are specified. The MB2400 is rated UL94-V0 for flammability, and meets UL and CSA standards.
www.nkkswitches.com

Non-contact prox switch

Standex Electronics has introduced the R12575 micro-proximity switch for use in non-contact position sensing in small spaces. Units feature a typical operating time of 0.2 ms, and release time of 0.1 ms (typical). The switch has a power rating of 3 VA maximum and will switch 0.1 A dc (max) with a carry current rating of 0.5 A dc. Switching voltage is 50 Vdc (max.) and operating range of -40° to 125°C.
www.standexelectronics.com

Control switch relay

The new Time Delay Control Switch Relay (TD-CSR) from Electroswitch is said to provide safe, effective, manual control of circuit breakers. Its flashing LED notifies the operator of a pending trip or close operation in time to evacuate the "arc flash" area. To reduce the chance of an inadvertent operation, the control buttons must be depressed for 4 continuous seconds to activate the 10-second delay. (Other delay times are available.)
www.electroswitch.com

Products: Data Acquisition

Ethernet data radio

The SureCross DXER9 Ethernet Data Radio by Banner Engineering is an industrial grade, 900 MHz radio used to create point to multipoint configurations of wireless Ethernet networks. Key features include: 10+ mile range outside line of sight, indicator LEDs for channel selection and signal strength, user configuration via internal web page, and built-in spectrum analyzer and firmware upgrading.
www.bannerengineering.com

2-port Ethernet/IP module

HMS Industrial Networks extended its Anybus-CC family with the addition of a 2-port EtherNet/IP communication module with integrated switch. The communication modules address Profibus, DeviceNet, CC-Link, CANopen, Profinet, EtherCAT and Modbus-TCP. Anybus-CC modules are used as communication interfaces of intelligent automation devices such as drives, HMIs, robots, inverters, instruments and scales.
www.hms.se

RFID control solutions

Pepperl+Fuchs has introduced IDENT-Control Compact, one and two-head RFID controller solutions. The Ethernet controllers have two onboard Ethernet connectors with a built-in switch. The controller supports Ethernet/IP, Profinet, Modbus/TCP and TCP/IP. The controllers have quick disconnects. The units read heads, including low-frequency 125 kHz for machine tooling, high-frequency 13.56 MHz for pallet tracking and logistics, and microwave 2.45 GHz for automotive applications.
www.pepperl-fuchs.us

Position sensor IP67 rated

Piher North America has introduced the non-contacting PSC-360 programmable Hall effect magnetic sensor featuring a switch function not found in other 360° absolute position sensors. The rotary position sensor offers operational performance between -40° to 150°C and accuracy over 360° at 0.5%. The bushing/panel mount style sensor features a standard ¼ in. D Flat shaft in a profile package of 13 mm. The sensor provides a mechanical life of up to 50 million cycles is IP67 rated.
www.piher.net

VPX-REDI backplane

SIE Computing Solutions has announced its enhanced 5-slot I/O PLUS 3U VPX full mesh backplane. The commercial off-the-shelf (COTS) solution offers high-bandwidth in a compact size and provides greater I/O flexibility through I/O PLUS, the use of configurable I/O daughter cards is provided to accommodate an array of VPX applications. I/O

PLUS brings two high speed VPX connectors to the front edge of the board and utilizes two interchangeable daughter I/O cards.
www.sie-computing.com

Handheld pressure

Ametek Calibration Instruments has introduced the JOFRA HPC500 and HPC502 which feature user configurable information display, 15 different pressure units, transmitter supply, mA input, % error calculation, voltage measurement, serial communication and external pressure module capability. The calibrators have a sixteen pressure ranges from 25 mbar (0.35 psi) to 700 bar (10,000 psi) with full scale absolute, differential and gauge sensors. It is accurate to ±0.025% of reading, 0.01% F.S.
www.ametekcalibration.com

Automotive Scene

Evolution not revolution – the route to fuel economy

The 2010 Ford Taurus demonstrates the increased power density from turbo-DI using EcoBoost turbocharging gasoline engine technology. Ford has found that it can reduce displacement by some 30% and still retain the same power.

By Bill Vance

Recently enacted U.S. Corporate Average Fuel Economy (CAFE) legislation requires automobile manufacturers to achieve a sales weighted fleet average of 35.5 mpg (U.S) by 2016. Canada follows the U.S. lead, which equates to 6.6 L/100 km. This almost 35% improvement over today has led to excited media speculation about increasing numbers of us driving battery-electric cars. And it's not just media.

Renault and Nissan CEO Carlos Ghosn predicts 10% of world new car sales will be pure electrics by 2020. More conservative, and probably realistic, opinion puts it closer to one percent. Electric cars still struggle with driving range, weight and cost challenges, and while the future of personal mobility will involve a mix of systems, including hybrids, plug-in hybrids, battery-electrics and possibly fuel cells, expect the internal combustion engine to be around for decades.

Engine development continues steadily with the trend to smaller fours and sixes producing higher specific outputs. Forced induction using turbocharging or supercharging will increase. Injecting the fuel directly into the combustion chamber (DI) gives more precise fuel distribution and timing, and allows higher compression ratios – up to 12:1 normally aspirated or some 10.5:1 with forced induction – through the cooling effect of the fuel entering the cylinder directly. DI also reduces emissions.

An example of this movement is Ford's "EcoBoost" turbocharged, direct injection gasoline engines. Ford has found it can reduce displacement by some 30% and retain the same power; the 2010 Ford Taurus demonstrates the increased power density from turbo-DI. Its 3.5 litre turbo-DI V6 produces 363 hp while the normally aspirated, port injection 3.5 develops only 263 hp, or 100 less.

Electric cars still struggle with driving range, weight and cost challenges

These types of engines will replace larger, thirstier V8s, and look for engines down to 1.4 litres to become popular. General Motors will fit its "global" 1.4 turbo-DI, 140 hp four to compact cars. Volkswagen will offer 1.4 litre, 164 hp turbo-DI four Golfs and Jettas, and Chrysler has plans for a 1.4 Fiat engine. In mid-size cars, turbo-DI fours with 2.0 to 2.5 litres and 250-plus hp are expected to replace larger V6s. Variable valve timing contributing to flatter, longer torque curves brings useful torque down into everyday driving rpm ranges.

The diesel engine is a quick route to better fuel economy but North Americans have so far been reluctant adopters. Diesels represent some 50% of European passenger vehicle sales, not surprising with their much higher fuel costs and diesel's approximately 30% better economy. They also develop very strong torque, such as Mercedes-Benz's 2.2 litre diesel's impressive 369 lb ft starting at just 1600 rpm. Some, such as Volkswagen, are exploring diesel hybrids.

Cylinder deactivation as used by General Motors, et al., will increase, as is expected for stop-start systems that shut off engines at stop lights. Air flow via intake valve control rather than throttle plate to reduce air restriction, a la BMW's "Valvetronic," will likely expand. Research into areas like compression ignition gasoline engines, variable compression ratios and two-stroke engines continues, although all may not make production.

Tires are making a contribution, such as Bridgestone's recently introduced "eco-friendly" Ecopia EP150 tire with 15% lower rolling resistance. Another area offering improvements is electric power steering with an electric motor replacing the traditional hydraulic pump, drive-belt and hoses.

Bill Vance is an automotive journalist & author (www.billvanceautohistory.ca).

DPN DESIGN PRODUCT NEWS
VOLUME 38 NUMBER 4 June/July 2010

Published by
CLB Media Inc.
240 Edward Street, Aurora, ON L4G 3S9
Phone (905) 727-0077
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Subscription Rates
CANADA - 1 year $35.00 including tax
U.S. - 1 year $59.50 US
FOREIGN - 1 year $105.00 US (Airmail)
Design Product News is published six times a year for the specifiers of materials and components in product engineering (OEM); in-plant (systems); and design/production engineering (the crucial stage between finished blueprint/CAD drawing and routine mass production).

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ISSN 0319-8413
Printed in Canada

For information on reprints of any article that appears in this publication, contact The Reprint Outsource at 1-877-394-7350.

Technical Literature

Fasteners. A 20-page product bulletin (available online and in print) from **PennEngineering** profiles PEM surface mount and broaching fasteners designed for use with PC boards. The various fastener products are suitable for component-to-board, board-to-board, and board-to-chassis attachment needs.
www.pemnet.com

Additive manufacturing. Wohlers Associates, Inc. has published *Wohlers Report 2010*, a 250-page analysis of the newest developments and trends in additive manufacturing (AM) worldwide.
www.wohlersassociates.com

Wire and cable. Alpha Wire has released its *Master Catalog* containing Xtra-Guard Performance Cable, Manhattan Electrical Cable, Alpha Wire Industrial Series Cable, hook-up wire, Dearborn Marine Cable, and FIT shrink tubing & wire management products.
www.alphawire.com

Wireless technology. *Wireless Communications version No. 26* from **Omega** contains 68 pages of wireless sensors, transmitters and receivers, Ethernet web based measurement and control devices for monitoring and recording data over the Internet. Coverage includes temperature, pressure, pH, humidity, flow and process applications for test & measurement, automation and industrial manufacturing.
www.omega.com

Test and measurement. Keithley Instruments has released a tutorial CD, *A Guide to Understanding Electrical Test and Measurement*, offering techniques for obtaining accurate and precise measurements. The CD includes how to troubleshoot, how to connect and how to select instruments.
www.keithley.com

Water industry. American Sensor Technologies, Inc. has released a six-page booklet outlining their pressure and position transmitter capabilities for the water industry. The booklet focuses on four categories of applications; including water pumps, subsea and desalination equipment, filtration monitoring, and well and sewage level monitoring.
www.astsensors.com

Power supplies. Brochure from **Staco Energy Products Company** covers the voltage regulation, power factor correction and uninterruptible power supply (UPS) products.
www.stacoenergy.com

Rubber products. Booklet from **Robinson Rubber Products**, *Designing with Rubber*, has guidelines for selecting and identifying rubber compounds; a glossary of terms; and a primer on compression, transfer and injection molding processes. It also explains the various molding feed operations, parting lines, edges, ribs and other geometric design considerations.
www.robinsonrubber.com

Electronics packaging. Verotec has introduced a 300-page product catalog, giving technical and application details of more than 4000 standard products. Each of the 14 individual sections can also be downloaded as a PDF from the relevant product section on the web site.
www.verotec.us

Advisory Board Directions

Design Advisory Service explores strategic design for new product developers

By Tim Poupore

Design by definition is the intellectual activity of identifying, planning and realizing the essential properties of a good or service. To be truly effective, design should be deployed strategically and consistently in a never-ending cycle of continuous improvement. The linear, tactical approach does not take advantage of the designer's full capabilities, and leads to less than stellar results.

Communicating the advantages of strategic design requires a comprehensive plan to address and educate distinct audiences, a means of introducing and demonstrating best design practices, and shifting business process from the tactical to the strategic.

Around since 2002, the Design Industry Advisory Committee, representing the six design disciplines (architecture, graphic, interior, and industrial design, fashion and landscape architecture) in Ontario launched a Design Advisory Service (DAS) in 2009 with support from the National Research Council's Industrial Research Assistance Program.

Create a successful next-generation product

The fundamental purpose of DAS is to mitigate commercial risk, just as IRAP seeks to mitigate technical risk, by connecting innovation-focused Small to Medium-sized Enterprises (SMEs) to experienced design practitioners who could demonstrate the benefits of design as a strategic business tool.

The DAS management team sought out SMEs who had not previously worked with designers, but who were facing particular challenges in their businesses that might be resolved through design. Each of the ten SMEs underwent a design audit that explored current business activities and identified areas where design could address specific commercialization goals.

The opportunities were articulated in a document that also served as a detailed design brief for a one-week demonstration project. Each SME was then introduced to a design practitioner with experience in the relevant design discipline who was accredited by their particular professional association.

But rather than attempt to thoroughly resolve an issue or complete an entire design project in one short week, the designer was given a mandate to use the brief time to effectively demonstrate design's value to the SME in significant and meaningful ways.

The breadth of industry sectors covered by these first ten projects was remarkable and included: automotive parts production and medical devices manufacturing; consumer products ranging from software to personal hygiene products and even arts & crafts; custom millworking; liquid coatings; solar energy capture; and, two construction industry-related projects which explored green roofs and sustainability, and the use of building information modeling (BIM) software.

Final case studies describing each of the ten DAS projects are now being prepared for publication on DIAC's web site (www.diac.on.ca). These will serve to illustrate how growth-oriented SMEs across Canada can connect with designers of all disciplines and reap the rewards of strategic design deployment.

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

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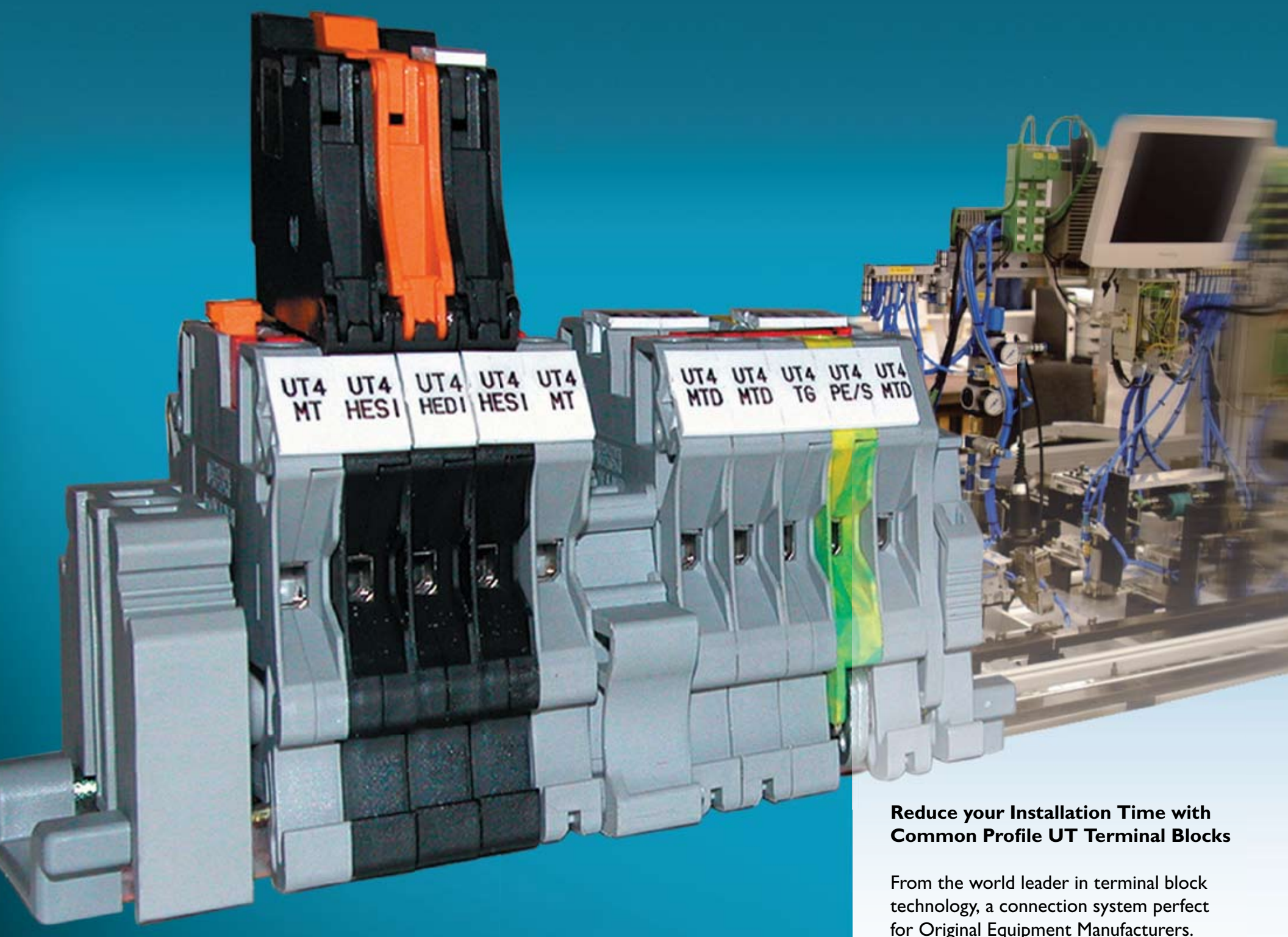

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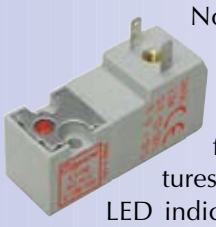
Clippard's new compact valves offer many features for design flexibility especially in applications with limited space. Available in 2-way or 3-way configurations, as Normally-Open or Normally-Closed, flow rates from 0.5 to 3.0 scfm are available dependent on the orifice size. Other features include highly-visible LED indicator light and manual override, quick response time, and multiple mounting and voltage options. For easy installation and versatility, select from five connector styles.



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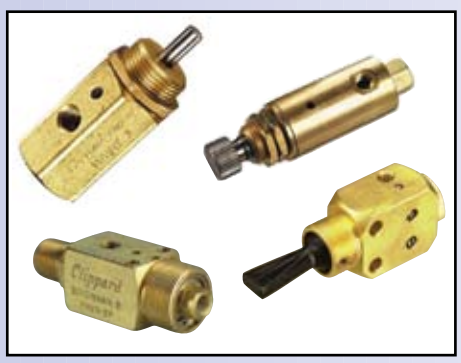

Clippard Brass Valves

Clippard offers poppet or spool designs; 2-, 3- or 4-way functions, in sizes from #3-56 and #10-32 through 1/8" NPT ports; and for pressures up to 300 psig. They are available with solenoid, air pilot, manual and mechanical actuators. Mounting styles include inline, panel mount, manifold mount or clearance holes for mounting screws. When you are looking for a valve, Clippard's minimatic line of valves provide a complete range of sizes and styles.

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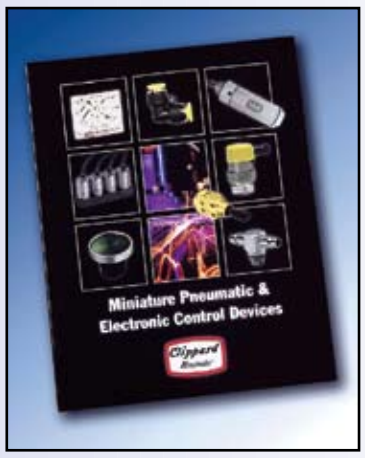

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