COVERING THE DESIGN ENGINEERING FUNCTION IN CANADA'S OEMs

DPN DESIGN PRODUCT NEWS

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INSIDE: Power Transmission | Adhesives & Fasteners | Data Acquisition | CAD

Designing the weight out of new vehicles

NX CAD/CAE used by Composites Innovation Centre to rapidly evaluate options

By Mike Edwards

Commercializing biofibre composite materials for body panels in vehicles has taken a step closer to reality.

The Composites Innovation Centre (CIC) Manitoba Inc. (www.compositesinnovation.ca) was approached by automotive design house Motive Industries Inc. of Calgary (www.motiveind.com) to prove out concepts for a biocomposite car and is currently close to completion of sample parts that will greatly reduce vehicle weight.

The Winnipeg-based CIC facility includes laboratory space for composite material characterization and a prototype assembly area, in addition to office locations for digital design and analysis activities.

Lighter vehicles simply require less energy to move, directly impacting the amount of fuel consumed and CO_2 released into the atmosphere.

"The challenge with taking the weight out is ensuring that you don't take the strength, stiffness and rigidity out with that weight," said Alastair Komus, principal engineer responsible for the ground transportation sector at CIC.

"That's where high strength-to-weight ratio materials like composites come in."

When Komus' team was approached by Motive Industries for assistance in developing the Kestrel fibre-reinforced plastic passenger car, the mandate was for CIC

Continued on page 7

PM# 40065710

Bonding in electric motors

DELO Industrial Adhesives has introduced anaerobic/light-curing adhesives for bonding magnets and other components in electric motors. One is a fluorescent type for application control while another is a dual-curing fluorescent with high viscosity.

www.delo-adhesives.com/us/

Linear spring series

Smalley Steel Ring Company has announced the Linear Spring series. The springs offer a selection of spring loads that react along a straight line, as opposed to a conventional spring that fits in a circular cavity.

www.smalley.com/linearsprings

Closed media valve

Festo has introduced the VZWF valve, a force pilot operated solenoid valve that can be used with water, air and neutral media. The units can switch at pressures as low as 0 bar and close automatically in the case of a pressure loss. Units can be applied in closed media circuits.

www.festo.ca

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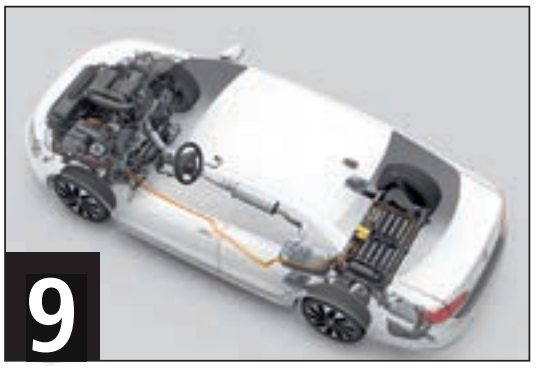
Baldor to move Mexican pulley production to Quebec

Baldor has announced Investissement Québec has agreed to support investments in Ste-Claire for pulley production coming from Mexico.

Jetta gets hybrid makeover from Volkswagen

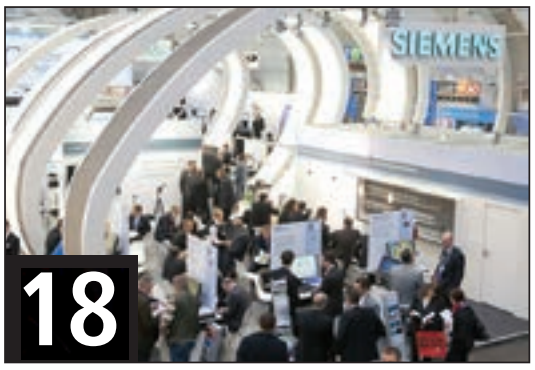


Volkswagen's 2013 Jetta does not follow the usual bland hybrid recipe, according to Bill Vance in the Automotive Scene.

When to use a fast cure adhesive (and when not to)

Fast cure adhesives are a great way to reduce assembly costs, but only in the right applications, says Master Bond.

Integrated Industry megatrend sweeps Hannover trade fair



Integrated Industry, is a megatrend that has companies moving towards merging their production and IT, was omnipresent at Hannover Messe 2013.

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THIS MONTH ON dpncanada.com

EXCLUSIVE ONLINE BLOGS

CAD Software Blog
Bill Fane covers the Siemens PLM Connection Americas User Conference 2013 in Dallas

Renderings Blog
Editorial Director Mike Edwards reports on PTC Live Global 2013 from Anaheim, CA

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Is Canada prepared for 'Integrated Industry?'

Hannover Messe 2013 trade fair previews the future of our factories now

Every year at Hannover Messe, the world's key suppliers to global manufacturers gather to promote better ways to make products or improve processes.

What trends should Canadian OEMs, machine builders and product designers be on the lookout for?

In the Digital Factory, the trade show at Hannover Messe for integrated processes and IT solutions featured in Hall 7, the "Integrated Industry" megatrend flowing from the globe's "4th industrial revolution" – Industry 4.0 – was brought to life. Digital Factory exhibitors presented products and tools for merging industrial processes and IT. Of particular interest were real-time data availability and mobile engineering using smartphones, apps and tablet computers.

Dr. Stefan Ferber, Director for Communities & Partner Networks at Bosch, sees clear advantages in Industry 4.0: "For manufacturing, networking offers above all greater flexibility and agility – data exchange between machines, work pieces and systems allows factory management to adapt flexibly to ever-changing requirements. In this way companies can reconfigure production processes to optimally distribute available capacities and resources."

The Bosch Rexroth approach to Integrated Industry resulted in its receiving the Hermes Award for its Open Core Engineering project. This is the first time that software has been honored with this award at Hannover Messe, and Chairman of the Board Dr. Karl Tragl speaks with *DPN* as part of our Hannover Messe 2013 coverage on page 18.

Bosch Rexroth Open Core Engineering software allows machine manufacturers to implement individual software functions themselves, and integrate standard-language-based IT technologies into their automation solutions.

When anyone discusses Industry 4.0, standards naturally come to mind. At Hannover Messe, DPN interviewed several members of the IO-Link consortium; including Balluff, Festo, Siemens, Beckhoff, B&R Automation and Bosch Rexroth. IO-Link is the first standardized IO technology worldwide (IEC 61131-9) for the communication with sensors and also actuators.

The powerful point-to-point communication is based on the long established 3-wire sensor and actuator connection without additional requirements regarding the cable material.

Balluff's Stephan Langer talks to DPN about how IO-Link products can help industrial sectors such as packaging, food and beverage, automotive, tooling machines, and renewal energy.

Sounds like Canada's manufacturers could benefit from adopting an Integrated Industry approach. DPN

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Video highlights at *dpncanada.com* cover developments from the world of design engineering from software and automation to mechatronics and fluid power.

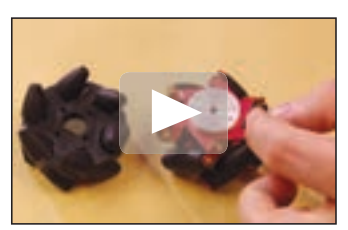
Baumer sensors monitor movement of emotional "Roboy" humanoid robot

Motion experts at The Baumer Group, in conjunction with a Swiss R&D institute, have helped to design and create Roboy, the first humanoid robot that moves, acts and responds like a human being.
http://ow.ly/ltIBF

Flying car from Terrafugia closer to reality with FAA compliance scrutiny

Terrafugia, makers of the "flying car" that you can park in your garage, had its Transition craft demonstrated for FAA officials in January 2013, bringing it one step closer to compliance and commercialization.
http://ow.ly/ltIOc

SparkFun Electronics demonstrates serial display and motor wheels assembly



SparkFun Electronics, the online electronics projects retail store, takes a close look at its OpenSegment Serial Display and its Mecanum wheels motor assembly in this web-based tutorial.
http://ow.ly/ltJHWW

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Canada
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NX CAD/CAE used to rapidly evaluate composite designs

continued from Front Cover

to incorporate exotic biofibres, including flax and hemp, into the body of the vehicle.

Sophisticated software was in order for CIC to assist companies like Motive Industries. Prior to investing in Siemens PLM Software's NX software (www.siemens.com/nx), engineers at CIC used multiple tools for geometry preparation and analysis of composite structures.

The goal with Kestrel was to create parts that were as light as possible, without compromising structural integrity. This meant frequent design-analysis iterations to be certain this delicate balance was being met across the entire vehicle

Example results from roof crush evaluation in NX CAE. Cover: Rendering of the Kestrel vehicle (courtesy Motive Industries).

assembly. The seamless associativity between design geometry and analysis models using NX allowed design changes to be quickly pushed to analysis models, with no need for manual updating.

NX Laminate Composites was deployed in defining and optimizing the ply layup. "With composites there are so many options, and so a flexible interface that allows you to quickly specify and experiment with a variety of parameters is essential," said Komus.

"Use of NX Laminate Composites ... allows us to really understand the stress in each ply and then change material orientation angles, ply location, or choice of material to optimize the weight and performance of the design."

Advancing compliance with federal safety standards virtually CIC engineers simulated federal motor vehicle safety compliance tests within NX. This included roof crush-resistance, which requires the roof to sustain a static load equivalent to 1.5x vehicle weight.

"By analyzing 50 different ply configurations, we were able to reduce the weight of the front tub component from 109 to 64 kg, a weight saving of 41%," said Komus.

In addition to the productivity-based benefits resulting from the use of NX, according to Komus, CIC also received prompt and capable technical support from MAYA, its Siemens PLM Software solution partner (www.mayahtt.com).

Founded in 2003 as a consortium of industry partners, CIC is currently funded in part by the governments of Manitoba and Canada in addition to members of its industrial alliance. CIC major clients include Boeing, Magellan Aerospace and New Flyer Industries. DPN

DPN acknowledges the contribution of Siemens PLM to this article.

Froude added to Harting sales force

MONTREAL – Harting has named Randolph Froude to the new position of Area Sales Manager for Ontario and Western Canada, the second stage in the company's plan to establish a strong sales presence in the Canadian market. The first, completed in 2011, was the opening of a national sales office in Montreal, headed by Claude Gravel. Froude, who has an engineering background with a leading machine builder and extensive experience in sales/marketing with major vendors, has built strong relationships with many large customers in Ontario by providing them with solutions to their interconnect needs.

Randolph Froude, Harting's area sales manager for Ontario and Western Canada.

"Randolph's appointment continues the process of establishing a personal relationship between Harting and our Canadian customers and building on what has been a very successful launch for Harting Canada," said Jon DeSouza, president and CEO of Harting, Inc. of North America as well as Harting Canada, Inc.

www.harting.ca

Baldor moves pulleys production to Québec from Mexico

Baldor, a member of the ABB Group, has announced that Investissement Québec has agreed to support investments in the Baldor Ste-Claire facility. The investment is intended to increase production capacity and modernize its equipment in preparation for moving a pulley production line from Mexico to Quebec.

The Ste-Claire management team successfully demonstrated to Baldor's headquarters in the U.S. the benefits of transferring four types of products from Baldor's facility in Mexico to Ste-Claire. "We appreciate the confidence that Investissement Québec has placed in Baldor," said Chris Poynter, VP of the Discrete Automation and Motion division for ABB in Canada.

www.abb.ca

Westec appoints Chartwell as master stocking representative

Westec GWconnect of Milan, Italy, has appointed Markham, ON-based Chartwell Automation Inc. as its master stocking representative for the Canadian market. Westec manufactures a comprehensive line of industrial rectangular connectors, junction boxes, cable glands and other components for connection, according to Steve Boehmer, VP sales and marketing at Chartwell.

Steve Boehmer, VP sales and marketing at Chartwell Automation Inc.

"The Westec line is a natural, logical and synergetic addition for us," said Boehmer. "Our technical field sales team has considerable experience and expertise selling rectangular connectors and more broadly a full range of connectivity solutions."

www.chartwell.ca

Fluid power addresses industry needs

Electrical controls make hydraulic and pneumatic applications increasingly sophisticated

At the end of the 19th century, fluid power systems started replacing equipment in traditional mechanical applications. Today, fluid power technology is found in numerous applications like vehicle steering, amusement park rides and industrial machinery.

> Fluid power has now includes increased safety, control and reliability

Equipment manufacturers have the responsibility to tame the brute force of fluid power technology. It is certainly on the cutting edge of manufacturing today – with the evolution of the electrical controls in the form solenoids then evolving into sophisticated proportional (PID) controls with feedback devices all over a Fieldbus network.

Decision makers and designers in the fluid power industry need to consider more than force and speed of the actuator. The latest fluid power technology offers smarter, faster, smaller and powerful products that are more reliable than ever before. Highly integrated technologies which offer energy efficiency, connectivity and accuracy – all with the highest safety considerations – are all part of the decision path these days.

The benefits of integrated technology, along with the traditional high power to weight ratio properties of fluid power, are allowing very sophisticated engineered solutions.

The demands of industry on fluid power technology often depend on compliance in any given jurisdiction along with local economic factors. Certainly the drive for product development around machine safety and energy efficiency are key trends. For example, high-speed packaging equipment builders are looking to meet the new European safety regulations while mobile hydraulic customers want low weight, compact and highly efficient systems based on the increased cost of fuel.

Safety is a critical part of any fluid power system, not just basic level safeguarding but evaluation of the entire system. The goal is to identify hidden or unexpected flaws with a safety review and incorporate best practices, for example, redundancy within a safety circuit.

The fluid power specialist requires engineering knowledge that involves fluid mechanics, electro-mechanics, electronics, software and controls.

The lines between electrical, mechanical and controls technology have become so blurred that training for a career in the fluid power is also a very important issue and is a challenge for both individuals and industry to stay up to speed on the latest technology.

The future for fluid power technology is bright as the focus will be on building "smart" products, increased energy efficiency and reducing the environmental impact. **DPN**

John Lamb is Chair of the Canadian Fluid Power Association (www.cfpa.ca) and Industry Segment Manager, Natural Resources at Festo Inc. (www.festo.ca).

VW joins hybrid sweepstakes with Jetta

Although Volkswagen is one of the world's largest automakers it hasn't shown much enthusiasm for hybrids. VW apparently has felt, with some justification, that its turbocharged diesel was a better route to low fuel consumption than burdening a vehicle with an engine plus an electric motor and a heavy, expensive battery pack.

VW does have its hybrid Toureg SUV (not sold in Canada), but until now no hybrid passenger cars. But with competitors on every side pushing out hybrid cars, Volkswagen no doubt felt some pressure to conform, even if only to avoid being thought a backward company.

Battery cooling air is drawn from the cabin, ducted under the rear seat and exited into the low-pressure area behind the right rear wheel.

The result is a hybrid version of the popular Jetta compact.

The Jetta already offered a wide range of models: gasoline fuelled 2.0 litre four, 2.5 litre five, both naturally aspirated, and a 2.0 litre turbo four. There is also a 2.0 litre four turbo diesel. The hybrid should surely complete the range.

Volkswagen's hybrid does not follow the usual bland hybrid recipe. Being a Volkswagen, it had to have the vigorous performance and taut and pleasurable driving characteristics that mark German cars.

So rather than the mild-mannered engines usually found in hybrids, VW has developed a spirited (107 hp/litre) all aluminum 1.4 litre inline gasoline four with 16 valves, direct injection, double overhead camshafts and turbocharger with intercooling. The cylinder head is cast integrally with the exhaust manifold, and the engine is transversely mounted between the driven front wheels, with a 12-degree rearward slant. Horsepower is a healthy 150 hp at 5000 rpm, and the high-for-forced-induction 10.5:1 compression ratio means premium gasoline is recommended.

Inserted between the engine and seven-speed, dual-clutch manumatic transmission is a thin, circular 27 hp liquid-cooled synchronous permanent magnet electric motor. The combined engine and motor output is 170 hp and 184 lb ft of torque. This could have been higher, but was limited by the torque capacity of the dual-clutch transmission.

The 36 kg lithium-ion 60-cell, air-cooled battery pack is located over the rear axle, and eats up about 4.2 ft^3 of trunk space, leaving about 12 ft^3. Battery cooling air is drawn from the cabin, ducted under the rear seat and exited into the low pressure area behind the right rear wheel.

The 1542 kg Jetta accelerates to 100 km/h in approximately 8.0 seconds and top speed is electronically limited to 200 km/h. Natural Resources Canada fuel consumption ratings are 4.5 L/100 km city and 4.2 L/100 highway, a little unusual in that hybrids usually excel in city driving. At some 1540 kg, the hybrid is 70 kg heavier than the four-cylinder Jetta GLI and about 100 kg heavier than the five-cylinder Jetta 2.5.

The Jetta hybrid is capable of travelling a distance of 1.9 km at speeds of up to 71 km/h on electric power, when in the driver-selected extra economical E-mode. The motor also provides assistance for acceleration and passing.

Regenerative battery charging is operative during braking and coasting, with a couple of clever features: the engine is decoupled during braking; and when the foot is lifted from the accelerator at speeds up to 135 km/h the engine is both decoupled and deactivated. The elimination of compression braking and accessory drag allows maximum deceleration regenerative charging.

In addition to making the powertrain as efficient as possible, engineers and aerodynamicists managed to reduce the hybrid's coefficient of aerodynamic drag to 0.28 from the 0.30 of a regular Jetta. A front air dam, rear deck spoiler and under body channels contribute to reduced air turbulence. Also, air entering the engine compartment is restricted to just the quantity required.

Underneath is VW's multilink rear suspension as used in the performance oriented Jetta GLI, which is superior to the torsion beam type in the regular Jetta.

Inside, the Jetta replaces the tachometer with what VW calls a power meter that encourages economical driving by displaying things like regeneration, the transitions from engine to battery power, and when combined gasoline-electric power is operating.

In offering its hybrid, Volkswagen has taken a different approach, one that combines a high output forced induction engine with auxiliary battery power to provide both performance and economy. It's an interesting and refreshing approach. **DPN**

Bill Vance is a founding member of the Automotive Journalists Association of Canada & author. (bvance1@cogeco.ca).

AC drive maker Vacon on growth phase

AC drives manufacturer Vacon has opened a 2100 ft² training facility in Stoney Creek, ON.

"That is one of the major training centres for North America along with warehouse, sales office and service centre," according to Doug Backman, managing director, Vacon Canada Inc.

Founded a subsidiary in the U.S. in 2007, the acquisition of TB Wood's AC drives business in 2008 also brought local manufacturing. Today, Vacon has operations in the U.S., Canada and Mexico and aims to increase its market share in the North American (NA) market.

"Our business in Canada has grown on average 73% CAGR from 2008 to 2012 and we have forecasted growth of over 20% a year for the next several years," added Backman.

"Due to expansion of business since my coming on board 3 years ago I have hired 3 more members to our expanding team in Canada."

Doug Backman (left), Vacon Canada managing director, and Thomas Doring (centre, front), president, Vacon North America, with the Vacon North America management team.

According to Thomas Doring, president of Vacon subsidiaries in North America, "It's not a question of whether Vacon is growing in the NA market. It's a question of how fast. It's a big market and we are working hard to utilize our potential in the right way."

Local manufacturing is an important prerequisite for success in NA. Moving to a new factory in Chambersburg, PA, in 2009 has made it possible to extend the range of manufactured products and expand production capacity.

"The next major step is to start production of VACON 100 units in Chambersburg. Another important goal is to scale up cabinet assembly operations. We are also enhancing our sourcing and logistics operations and enlarging our application software team," explained Doring. **DPN**

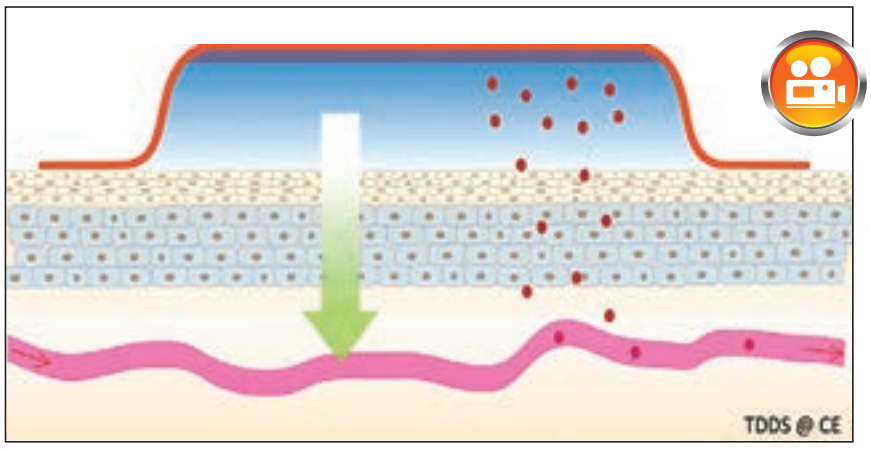
A version of this article appeared in the Vacon magazine driven 1/2013.
www.vacon.com

By Mark Sunderland

Patching up the process of drug delivery

Needles and ingestion not always the best treatment method

For many people, a drug (as in a medication) is ingested into the body via a needle, a pill or a spoon. Each way is invasive. Needled doses have the greatest possibility of retention but oral methods have to go down and stay in long enough to work.



The transdermal patch is constructed in a manner that enables medication to contact and penetrate the skin either via a porous membrane covering a reservoir of the medication or through body heat melting thin layers of medication embedded in the adhesive.

Advancing the concept of non-invasive drug delivery is currently one of the most attractive areas of pharmaceutical research. The design of nanosystems that can enable drugs to be absorbed by a patient at the correct time and dosage by application to the skin has far-reaching potential. In the parlance of pharmacology, a drug that enters the body through the skin into the bloodstream is "transdermal."

A transdermal patch is a medicated adhesive fabric that is placed on the skin to deliver a specific dose of medication into the bloodstream and it is often used as a means to promote healing to a wound. The advantage of transdermal drug delivery over other types of medication delivery – for example, oral, topical, intravenous, intramuscular, is the controlled release of medication into the patient.

The patch is constructed in a manner that enables medication to contact and penetrate the skin either via a porous membrane covering a reservoir of the medication or through body heat melting thin layers of medication embedded in the adhesive.

The principle disadvantage to transdermal delivery systems is that the skin is a very effective barrier and consequently only medications with molecules small enough to penetrate the skin can be delivered transdermally. Although there are a variety of pharmaceuticals currently available in transdermal patch form, the potential is limited by the process. With present delivery methods, the successful transdermal drugs have molecular masses that are only up to a few hundred Daltons.

Despite the obstacles, there are incentives to drive development both economically and functionally. Transdermal systems are non-invasive and can be self-administered. They can provide release for long periods (up to one week). The systems are generally inexpensive and they can also improve patient compliance. A distinct advantage over hypodermic injections is not only the absence of possible pain but the reduction of dangerous medical waste and the risk of disease transmission by needle re-use, especially in developing countries.

Another method of non-invasive drug delivery employs the use of infrared light. Research is currently being conducted by Edmund Optics of Barrington, NJ, to curb the complications of psoriasis, a chronic immune-mediated disease that affects the skin. **DPN**

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

Bonding processes get automated

Accelerate production while lowering unit costs

By Torsten Uske and Dr. Martin Kluke

The manufacturing world is constantly looking for processes that can accelerate production while lowering unit costs and improving product reliability.

Bonding processes should be capable of smoothly running in automated processes requiring short cycle times. UV and other light-curing adhesives, like those developed by DELO Industrial Adhesives, meet those criteria better than older adhesives and other joining solutions in a wide range of industrial applications.

Without these fast-curing UV and other light-curing adhesives, it would not be possible to produce mobile phones, smart cards, embedded cameras, even shower enclosures, as we know them.

Both UV- and light-curing adhesives offer their own advantages in different application scenarios. For both chemistries, it is essential to adapt the wavelength of the photoinitiator with the wavelength of the UV light source to ensure an effective curing reaction. Light sources based on LED technology are favored, because with their distinct "peak" emission spectrum, the photoinitiator of the adhesive is designed to activate near the peak of the LED light source.

Light-curing adhesives are particularly well-suited for and gaining market share in high volume applications where rapid curing and high reliability are essential, like the production of microswitches used in the automotive industry and other sectors.

In assembling snap-action switches for automotive use, hermetical sealing of the switch housings and connectors is essential for withstanding variable environmental conditions in vehicle operations. It is often necessary to bond the housing and seal the connector pins in a single step (seal-bonding).

Production volumes are in the many millions so the individual pieces must be joined in a continuous, high-speed, completely automated process, a job for which two-component or heat-curing adhesives and encapsulants are neither particularly reliable or cost-effective. The complex and high-maintenance processing systems for two-component adhesives work only where bigger adhesive amounts (>100 mg) are dispensed.

Dispensing and curing process of an automated production line for snap-action switch sealing. Switches can then be used in applications such as automotive assembly.

In contrast, UV- and light-curing adhesives like DELO-KATIOBOND are optimized for bonding automotive parts to seal them against fluctuating temperatures, humidity, contaminants, pressure, and shocks. The capital and operating costs of light-curing lamps are much lower than for thermal curing in ovens.

Light-curing adhesives are easy to dispense in automated, high-volume operations and cure within seconds – much faster than thermal curing. Their constant viscosity and unchanging flow properties allow complete wetting and reliable sealing and the bond holds up exceptionally well through years of use.

In addition, a direct 100% in-line control of seal tightness is possible since acrylate-based, UV/light-curing adhesives like DELO-PHOTOBOND achieve final strength immediately after irradiation. Fully automated camera inspection of the bond can be done in-line by using colorants and/or fluorescent agents in the adhesive, ensuring detection of insufficient adhesive or possible contaminations at the connector pins.

The light-curing adhesives for such an application boast high flexibility over a wide temperature range (-40° to 176°F), essential for maintaining a reliable seal. **DPN**

Torsten Uske is president, and Dr. Martin Kluke is product manager, DELO Industrial Adhesives LLC.
www.delo-adhesives.com/us/

When to use a fast cure adhesive (or not)

Extra set up time can be crucial for engineering processes

When performing assembly operations, it pays to be fast. Spend less time putting a product together, and that product will cost less to produce.

This bit of conventional wisdom explains the growing popularity of fast cure adhesives, which can save significant amounts of assembly time.

How much time? The fastest two-part epoxies have fixture or handling times as low as 1 to 2 minutes, while comparable conventional epoxies could require 15 minutes or more.

Fast curing one-part epoxies can fully cure in minutes at 125°C, which can save an hour or more of cure time versus conventional one-parts. Similar savings can be achieved with speedy silicones that set up in minutes rather than the more typical 1 to 2 hours or more.

Here's an overview of the different types of fast cure adhesives and how to tell when faster really isn't better.

Like their slower curing counterparts, fast cure adhesives are available in a wide range of one- and two-part formulations. Beyond their potential to save handling and full cure time, each formulation has its own set of strengths and weaknesses.

In general, though, one-part fast cure adhesives earn high marks for ease of use since they eliminate the need for mixing and cut fixturing time significantly. On the other side of the balance sheet, they have a more limited range of physical and mechanical properties than comparable two-part formulations. And because their

Master Bond's fast curing adhesives offer more than a speed advantage. They can also be formulated for specialty applications. For example, Master Bond EP65HT-1 combines fast room temperature curing with low outgassing performance to NASA specs. It also offers superior electrical insulation capabilities and chemical resistance.

cure reaction is exothermic, or heat generating, one-part fast cure products are not the best choice for many potting applications.

Two-part fast cure products are also not a good fit for most potting applications, owing to their exothermic cure mechanism. Moreover, two-part products sacrifice some ease of use because they do require precise mixing on the factory floor. In high production volumes, they may not be compatible with manual mixing and dispensing methods.

On the plus side, two-part products are far more versatile and offer a broader range of properties than the one-part fast cure products – though not nearly as broad as standard two-part epoxies.

Fast cure adhesive products do tend to trigger capital equipment costs. So their use should hinge on an economic decision that balances the savings from shorter cure times against the added expense of higher adhesive costs. In many assembly applications, the economics will make sense. In others, they may not.

Applications with very low production volumes, for example, may not be able to justify higher adhesive costs through improvements to assembly throughput. The same reasoning goes for applications in which adhesive bonded joints are few in number or simply don't represent a significant bottleneck in the overall production process.

The misuse of fast cure adhesives doesn't always come down to their end-use properties. One common mistake involves a failure to account for open time needs during assembly. It's counter-intuitive, but a fast cure can actually hinder smooth, cost-effective assembly operations if it leaves no time to position parts correctly in a fixture.

Savvy engineers will intentionally pick slower curing adhesives with longer open times when confronted with difficult fixturing processes. In these cases fixturing difficulties, not cure time, drives the cost. DPN

This article was excerpted from a Master Bond Tech Spotlight. Go to http://ow.ly/lpkBN to read the complete white paper and adhesive technical specifications.
www.masterbond.com

Inventor 2014 gets it all together for you

Join functionality operations combines assembly constraint and motion control

Autodesk Inventor 2014 has introduced a new type of assembly constraint, as well as a new type of motion control.

Okay, I lied – the new joint functionality does both at once, in one step. Better yet, it can automatically detect the type of parts and features that you're connecting and automatically add the appropriate connection.

Have you ever copied a group of component parts in an assembly?

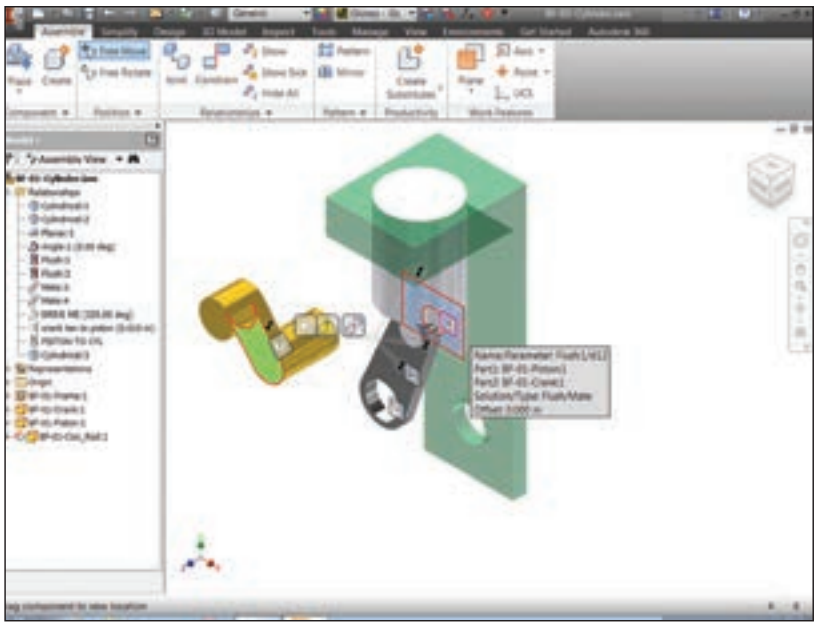
Consider the simple example of two simple cubes, such as kid's building blocks. Previous releases would have required a mate face-to-face constraint and then two flush face-to-face constraints. In Inventor 2014 (www.autodesk.com/inventor for a free trial) this can be done with a single Rigid connection. There are six types of joint. They range from Rigid to Ball, the latter giving a ball-and-socket connection.

Joints also have another difference from constraints. You may have a part that isn't fully constrained so it can still move. Now you want to temporarily lock it down so it can't move. Joints can now be locked so that any remaining degrees of freedom of the part are temporarily suspended. The part itself can't move along any of its degrees of freedom, but it can still move as a unit with anything else to which it is connected.

The existing constraint functions still exist and can work co-operatively with connections. Both types are now referred to collectively as "relationships."

An interesting new function is called Free Move. No, this doesn't mean you don't have to pay for it. The Free Move command lets you click on and drag an assembly component. "Rubber band" lines then show you all the relationships attached to the part, and hovering on the relationship icons that appear highlights the particular features that define the relationship. A right-click context menu lets you suppress, delete, or modify relationships.

Free Rotate temporarily suppresses relationships and lets you "3D orbit" a part within an assembly.



Free Rotate in Inventor 2014 temporarily suppresses relationships and lets you "3D orbit" a part within an assembly.

Inventor 2014 adds Express mode functionality to speed the opening of very large assemblies by a claimed 4 to 6 times faster. You set threshold parameters, and if an assembly exceeds them then it automatically opens in Express mode.

Have you ever copied a group of component parts in an assembly? You don't want the overhead of creating a sub-assembly, all you want is a couple of copies of something like a simple bracket along with the nut and bolt that hold it in place. No problem, just copy them. Oops, problem. The copies have lost all the relationships between the components within the set.

Not any more. When you copy a set of components in Inventor 2014 then all the internal relationships are retained. Hooray!

Not unexpectedly, Inventor 2014 files are not backward-compatible to earlier releases, and Inventor 2014 itself isn't compatible with earlier Windows versions; it now requires Win 7 or later, but it is available in 32-bit and 64-bit versions. DPN

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

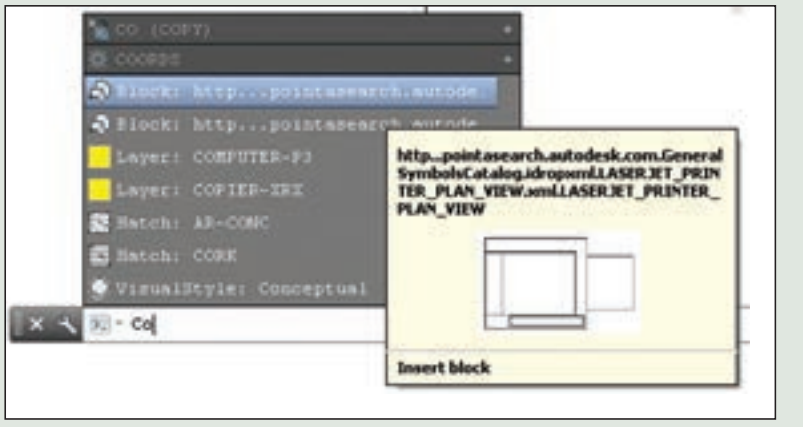
AutoCAD 2014 lets your fingers do the talking

In this era of ribbons and icons, people often refer to AutoCAD's "archaic" command line method of typing in commands at the keyboard.

The bottom line, however, is that most real "power users" such as Lynn Allen and Dave Espinoza-Aguilar still use keyboard entry of commands and options. It is by far the fastest method of running AutoCAD, especially once you memorize the one or two letter shortcuts for the most common commands.

Autodesk seems to be recognizing this fact, and the last couple of releases have subtly slipped in new functionality to help keyboard users. AutoCAD 2014 (www.autodesk.com/autocad for a free trial) takes a big step in this direction.

For starters, it expands on the autocomplete feature introduced in AutoCAD 2013. It no longer just finishes entering a command name that you have started, but will "auto-begin" as well. This means that if you enter the three letters PLA then AutoCAD will offer a list containing all 31 commands that include the three-letter sequence anywhere within them, such as PLAn, vPLAyer, sectionPLAne, and so on. Simply click on the one you want and its off and running. It also has some intelligence in that as you continue to use AutoCAD 2014 it remembers your selections and moves the choices you select most often to the top of the offering list.



All I did was to type CO at the command line in AutoCAD 2014.

The new command-line functionality also includes a spel checkquer. If you fumble-finger and type Lauer, for example (note where the Y and U keys are on your keyboard), it knows you probably meant Layer and acts accordingly. Similarly, there is now a synonym list so that entering Contour starts the Spline command. This list is user-editable, so on my copy of AutoCAD 2014 I can enter TimHorton whenever I want a doughnut. DPN

SIEMENS

NX CAE Symposium Nov 5-6

Great Decisions in Product Engineering #137.

A simulation specialist tries five design alternatives before lunch... and the company exceeds sales targets before mid-year.

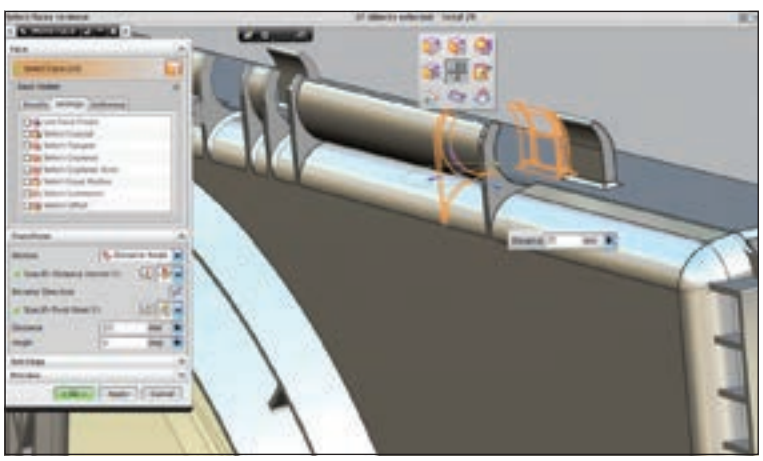
NX CAE: Smarter decisions, better products.

Sometimes, the smallest decision in product engineering has the greatest impact on a company's success.

NX CAE from Siemens PLM Software gives everyone involved in analyzing your product's performance the solutions they need to efficiently model, solve and evaluate results. The benefit: your engineering organization rapidly explores game-changing alternatives, makes smarter more timely decisions—and delivers great products.

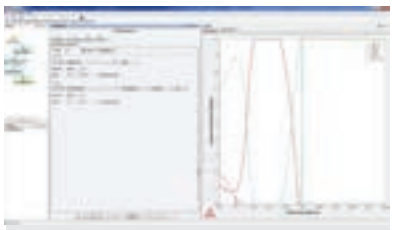
Find out how NX simulation solutions can help you make the decisions that make your product better.

Learn more at **siemens.com/plm/nxcae-symposium.**



With NX CAE, engineers can modify geometry intuitively, update simulation models automatically, and evaluate design changes rapidly.

Answers for industry.



Multicomponent thermodynamic calculations

Thermo-Calc, software for calculation of multicomponent thermodynamics and phase diagrams, incorporates both a command line user interface (Console Mode) as well as a modern graphical user interface (Graphical Mode). There are also modules for specific calculations, such as Scheil-Gulliver simulations of alloy solidification.

www.thermocalc.com

Rhino 3DM for iOS devices

Rhino has announced that users can now view any Rhino 3DM files from v1.0 through 5.0 on the iPad, iPad Mini, iPhone and iPod Touch. The new app version of iRhino 3D permits users to browse thumbnails of the Rhino files on their devices, as well as Zoom, Pan, and Rotate very large models quickly, even on an iPhone 3GS, the company says.

www.rhino3d.com/ios

Root cause analysis of NVH problems

LMS International has released Rev 12 of LMS Test.Lab, its integrated testing solution for noise-vibration-harshness (NVH) engineering. Rev 12 improves the results accuracy of Transfer Path Analysis (TPA), one of the key analysis methods in LMS Test.Lab. TPA is a technique that is commonly used to solve vibro-acoustic issues.

www.lmsintl.com/testlab-rev12

Maple 17 offers more math, signal processing functions

Maplesoft has announced a new release of its flagship product, Maple 17 technical computing software. Introduced is new functionality that can solve a whole new class of differential equations, advancements in solving systems of equations, new signal processing tools, expanded support for physics, statistics and dynamic systems.

www.maplesoft.com

Five keys to selecting the right consultant

Proper guidance can help more than adding new software or staff

By Scott Hale

Pulling out of an economic trough is always a challenge for manufacturers. We hear CEOs and business owners across Canada saying they need additional capacity, but can't hire more staff or buy new software.

Don't be discouraged because there's a relatively simple, but often overlooked answer that when executed correctly, can pay off in big returns over a short timeframe.

Instead of hiring new staff or purchasing software, why not buy productivity guidance from a seasoned team of professionals who know your business and understand technology? We all know that a lot of design engineering processes are redundant and inefficient, often introducing room for error. It's the typical scenario in which you spend 25% of your time doing useful things and 75% of it waiting around, performing repetitive tasks, or hunting for information. But because you have been part of the system for years, it's hard to recognize those areas from the inside.

A consultant can help identify the bottlenecks and recommend ways in which processes could move more efficiently. While you may be reluctant to spend money in a downturn, a typical productivity improvement project could result in massive savings. In the last six months I've seen a 200% reduction in design time on one project and on another, a 50% reduction in time to ship.

But if hiring the right consultant for your business was that easy, everyone would have done it already. So let's explore the five key considerations to help you hire the best consulting team for your particular situation.

1. Do your best in-house to define what you want to accomplish. Is it reducing the time to complete drawings? Being able to take quotations and turn them rapidly into accurate product specifications? When you share your goals or challenges with potential consultants, remember that a good one should be able to help you clarify your objectives – perhaps even pointing you in another direction based on their past experience.
2. The technology world moves fast and involves many different skill sets. No single consultant is going to be able to know everything in the complex world of design engineering. Look for a consultant who works within a team of professionals with different skill sets so that you can leverage their scale and breadth of knowledge when necessary. Are they savvy enough to not only help you stay ahead of today's technology trends, but also provide guidance for the long-term growth of your company? In addition to technical expertise, ask yourself whether or not they have worked in your industry before? Demonstrable industry knowledge is an important consideration.
3. Determine if they have the project leadership and strategic planning skills that are required when looking at productivity improvement. Are they knowledgeable enough to identify new workflows that will improve efficiency? Can they provide a complete sales-to-order perspective? Do they possess the leadership abilities to guide your team to success? A good consultant will understand both your business and the latest technology trends that will help you maintain a competitive advantage over a period of years.
4. It's simple, but this step is often overlooked. Remember that the sales person who won you over will not be the technical person you'll be working with. Pick up the phone and talk to the technical team of professionals you'll actually be engaged with. And of course, speak with references and ask them to relate their experience, whether or not they achieved their goals and how the consultant helped them to get there.
5. Finally, have the consultant create a detailed statement of work that you both agree to and sign. Understand what your working relationship will look like and how the project will roll out in terms of time frame, deliverables, budget and milestones. **DPN**

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www.imaginit.com

Hannover Messe 2013

Integrated Industry megatrend sweeps trade fair

HANNOVER, GERMANY – Hannover Messe 2013, the international trade fair for automation and manufacturing, featured a megatrend that was on display throughout its halls. Industry 4.0, leading to Integrated Industry, is a technological wave that has companies moving towards merging their industrial processes and IT.

At the fair's opening speech, Friedhelm Loh, president of the German Electrical and Electronic Manufacturers' Association (ZVEI), said, "We remember the high expectations we had in the 1960s and 70s, when everyone was talking about CIM – Computer-Integrated Manufacturing – as the connecting link uniting factory automation, production planning and control.

"Today we are a lot further on in technological terms, and we can rightly speak of the 'fourth industrial revolution,' otherwise known as Industry 4.0."

Siemens demonstrated its five stages for successful product creation, including design, engineering and planning.

In the videos below, our progress towards the goal of an Integrated Industry approach is discussed from many perspectives, starting with Dr. Karl Tragl, Bosch Rexroth AG chairman of the executive board. Dr. Tragl describes how its dedication to this approach led to its Open Core Engineering software platform and this year's Hermes Award.

Siemens has identified the five necessary stages for successful product creation – design, planning, engineering, execution and services such as condition monitoring – to come up with an integrated product strategy, according to Joris Myny, Siemens Canada VP of Industry Automation and Drive Technologies.

Another automation product developer, Harting took the Industry 4.0 approach at its booth with section that could have come out of *Charley & The Chocolate Factory*, linking ERP with an assembly line demo. **DPN**

WATCH: Executive interviews and booth tours at dpncanada.com KEYWORD – Hannover Messe 2013:

Bosch wins Hermes Award for Open Core Engineering

Bosch Rexroth chairman Dr. Karl Tragl explains why the company received the 2013 Hermes Award for its Open Core Engineering system that unites the worlds of PLCs and information technology.
http://ow.ly/lsF3B

Festo executives boost edrives, process automation

Canadian president and CEO Thomas Lichtenberger and chairman of the management board of Festo AG, Dr. Eberhard Veit, weigh in on topics such as edrives and process automation.
http://ow.ly/lsIvV

Balluff demonstrates IO-Link technology versatility

Stephan Langer from Balluff demonstrates the versatile IO-Link factory automation platform that goes beyond the company's traditional sensor business into areas such as connectivity and industrial networking.
http://ow.ly/lsIWJ

Rittal's RiMatrix S new data centre vision

Rittal's Wolfram Eberhardt explains the quick commissioning benefits and energy efficiencies of the RiMatrix S modular data centre system by offering a standardized approach.
http://ow.ly/lsJH0

DELO anaerobics bond electromotors' rotor, shaft

Sales director Christian Walther of DELO Industrial Adhesives explains the bonding of a rotor onto a shaft in electromotor manufacturing using a new generation of anaerobic/light-curing adhesives that provide easy application control.
http://ow.ly/lsK8S

Harting Industrial 4.0 – from front office to factory floor

Peter Feldmann, Business Development AutoID at Harting IT Systems Integration, demonstrates his company's approach to Industry 4.0 with chocolate candy assembly line demonstration tied into an MRP front office application.
http://ow.ly/lsKM4

SEW-Eurodrive power transmission for all sectors

Anthony Peluso, newly appointed vice president of SEW-Eurodrive Co. of Canada Ltd., describes the company's broad line of drives, gears, motors and controls for applications in natural resources, packaging and food & beverage sectors.
http://ow.ly/lsOpo

Siemens demos the five stages for successful product creation

Joris Myny of Siemens Canada outlines how Siemens provides the technology for the 5 necessary stages to successfully create products: design, planning, engineering, execution and services such as condition monitoring.
http://ow.ly/lsPj0

Rings make 360º contact with the groove

Spiral retaining rings from Rotor Clip for installation in housings and shafts can either be single or multi-turn, depending on the application requirements. Multi-turn, spiral-wound retaining rings consist of two or more turns of in-house rolled flat wire material with rounded edges. The material is coiled on edge to provide a gapless ring with 360º of retention. Spiral rings offer space savings in a radial direction since there are no assembly lugs as with tapered retaining rings.

www.rotorclip.com

Quick clamping shaft collars in larger bore sizes

Ruland Manufacturing Co., Inc. has expanded its quick clamping shaft collar line to accommodate sizes up to 3 in. and 75 mm. They are designed for light duty stationary or low-RPM applications that require quick positioning adjustments or frequent set up changes where the use of tools is not practical. Quick clamping shaft collars are said to slide on the shaft smoothly and have easy access to the handle, allowing them to be removed or repositioned with little effort. When installed the handle sits flush with the outside diameter making them suitable for rotating applications. The design features a tension-adjustment screw which makes the collar compatible to shaft tolerances.

www.rotoprecision.ca

Two-component epoxy meets UL 94V-0 specs

Featuring a non-halogen filler, Master Bond EP21FRNS-2 epoxy passes UL 94V-0 testing for flame retardancy in potting, encapsulation and casting applications. It is said to produce very low smoke levels and is suitable for the computer, aerospace and related industries. The two-part epoxy features a one to one mix ratio by weight and cures at room temperature or more quickly at elevated temperatures. The epoxy's handling is further facilitated by color coding – Part A is black and Part B is off-white.

www.masterbond.com

Washdown duty motor

Baldor Electric Company has introduced the Super White Washdown Duty motor designed for humid and moist environments in the food and beverage industry. The autophoretic autodeposition exterior surface preparation method makes the white epoxy finish coat of this motor 5x more resistant to corrosion and chipping than previous methods. The shaft, hardware and nameplate are all 300 series stainless steel. The NEMA units are available from 1 to 20 hp, 56C through 256TC.

www.baldor.com

Single phase AC motor drives available up to 3 hp

Lovato Canada has launched the single phase AC motor drive VE1 series. Units are available from 0.25 to 3 hp with a built-in EMC suppressor (first environment, category C2). Features include: 200…240 Vac power supply; integrated PID, potentiometer and control panel; 0…650Hz output frequency; 8 preset speeds with independent acceleration and deceleration time: and, built-in RS485 communication port (Modbus-RTU). The drive series also includes: V/f curve configuration; sequencer (frequency/time cycles); 0…10 V or 0/4…20 mA analog input; and, 0…10 V programmable analog output; setup software.

www.lovato.ca

Offset couplings have zero maintenance bearings

Zero-Max "Schmidt" offset couplings now feature needle bearings with internal micro-poly lubrication that do not require periodic maintenance. The couplings transmit constant angular velocity and torque in a wide range of parallel shaft misalignments. Units are designed to handle parallel offset up to 17 in. and are available with torque capacities up to 459,000 in. lb. With applications for high quality printing, embossing, paper converting, pharmaceutical manufacturing, and automated assembly systems, the couplings are said to provide the utmost in precision without maintenance on parallel offset shafts.

www.zero-max.com

Gear reducers and servo couplings

GAM Gear, a manufacturer of gear reducers, servo couplings, and linear mounting products has released its 102-page 2013 GAM catalog. A product selection guide helps users find the right product based on technical specification, configuration, or feature. The online catalog is interactive with over 16,000 products that can be configured to user specifications and then downloaded in popular 2D/3D CAD formats.

www.gamweb.com/literature.html

Spring-engaged brakes with high thermal dissipation capacity

Nexen Group has introduced the FMBS line of flange-mounted, spring-engaged safety brakes with high thermal capacity for NEMA C-Face motors and gear reducers. The brakes are available in two models that provide torque from 1080 to 1800 in. lb and burnished torque from 1300 to 2160 in. lb, with release pressures of 55 and 90 psi and a maximum pressure of 120 psi. Both models feature a top speed of 1800 rpms and zero backlash input.

www.nexengroup.com

Twin-wheel caster with bolt-on directional lock

The Revvo Caster Company has introduced the 2H series twin-wheel casters that feature a secure bolt-on, four-station directional lock that converts swivel casters into fixed casters for straight-line travel. Designed for power towing up to 16 kph, the casters combine the differential action of dual wheels with a narrow footprint to facilitate ease of turning. Three wheel sizes of 125 mm, 150 and 200 mm with load capacities ranging from 720 to 1500 kg are offered.

www.revvocaster.com

Wireless non-contact switch

Honeywell has expanded its Limitless Wireless Solutions portfolio with the introduction of its Limitless Non-Contact Switch WLS series. The series uses non-contact technology, enabling the device to actuate based on the presence or absence of magnets installed on a customer's device. The battery-operated switch allows customers to choose either top sensing or side sensing.

http://sensing.honeywell.com/

Interlock safety switches

AutomationDirect has expanded its line of safety products with additional tongue interlock and cable-pull safety switches. Tongue operated safety interlock switches are designed to fit to the leading edge of sliding, hinged or lift-off machine guards and provide a tamper resistant actuator mechanism for position interlock detection on moving guards. Models provide ½-in. NPT openings, and are available with or without reset button; units with an e-stop button, as well as red/green LED (24 Vdc or 110 Vac) versions.

www.automationdirect.com/safety-switches

Switch radiates white ring

Schurter has expanded its MSM series metal pushbutton switch to include a version with white ring and point illumination. Color options include red, green, yellow and blue. The 24 V series also expands its range of integrated resistor options to include 5 and 12 V versions. Construction includes a stainless steel housing and actuator, with a micro switch snapped into the housing. Housings are available in 19, 22 and 30 mm mounting diameters. Switching voltage ratings range from 5 Vdc to 250 Vac and current ratings from 0.1 to 10 A.

www.schurterinc.com/new_switches

Miniature switches in variety of styles

The LB series, a line of 16 mm miniature switches from IDEC, has expanded to include illuminated selectors, lever selectors, dome pilot lights, lever switches and buzzer models. Projecting only 2 mm when flush-mounted on a panel, the switches are said to provide a sleek, updated look suitable for applications requiring a hygienic surface. All LB switches are UL recognized, TUV approved, CSA certified and CE marked, as well as provide an IP65 degree of protection.

www.idec.com/switches

C1 D2 certified 8-channel optocoupler

In 22.5 mm of DIN rail space the DePro 8-channel optocoupler from Emphatec provides 8 isolated optocouplers with constant current inputs in a range of 10 to 150 Vdc, 70 to 120 Vac. Class 1, Division 2 certified, the input current is constant at approximately 4 mA regardless of the input voltage.

www.emphatec.com

Infrared vision sensor has integrated daylight filter

Inspection, bar code and text reading processes for vision sensors can be significantly impaired by changing ambient lighting conditions. Simultaneously, employees and technicians are often bothered by the pulsing red light of normal vision sensors. Balluff has introduced the BVS vision sensor with built-in infrared lighting and integrated daylight filter said to eliminate both of these problems. Features include: 10% higher light intensity than comparable red light sensors; integrated daylight filter for increased process reliability; and, safe for the eyes – certified for CE (EN 62471:2008).

www.balluff.com

Double-deck fuse, disconnect terminal

At 5.2 to 6.2 mm wide, WAGO Corp.'s TOPJOB S double-deck fuse and disconnect terminal blocks are up to 24% more compact than existing designs on the market, the company says. Space-efficiency is achieved by carrying fusing or disconnect capabilities on the top deck, and through or ground connections below. Blocks support process measurement applications requiring a common profile for feed-through, disconnect/test and fusing of analog signals. Carrier blocks come in six configurations including double-deck through terminal block and 4-conductor, double-deck terminal block with internal commoning.

www.wago.us

Encoders and inclinometers with J1939 interface

POSITAL has introduced inclinometers and absolute rotary encoders are available with J1939 communications interfaces. Units with J1939 interfaces are suitable for control and safety systems for vehicles and off-road equipment. In addition to IP69K-rated sealing that withstands salt spray or water jets from pressure washers, the inclinometers can measure tilt in two dimensions (±80°) for monitoring pitch and roll in off-road vehicles or vessels, or for positioning crane booms or other moveable components. Absolute rotary encoders make use of magnetic measurement technology that is said to deliver accuracy, reliability and tolerance for high shock and vibration loadings.

www.fraba.com

Wireless sensor system provides web-based monitoring

The OMEGA zSeries wireless sensor system provides Web-based monitoring of temperature, humidity, and barometric pressure. The compact wireless "End Devices" mount discretely on the wall in clean rooms, laboratories, and any remote facility. The End Devices transmit up to 300 ft (without obstructions) to a "Coordinator" connected directly to an Ethernet network and the Internet. The wireless system complies with IEEE 802.15.4 operating at 2.4GHz. The device can trigger an alarm if variables go above or below a set point.

www.omega.ca

LVDT/RVDT signal conditioner

Macro Sensors has introduced the EAZY-CAL LVC 4000 signal conditioner with analog (4 to 20 mA or user selectable voltage) and RS485 outputs. Compatible with most LVDT and RVDT linear position sensors, including half bridge, the signal conditioner digitally communicates with up to 16 devices simultaneously and can be connected together in master/slave configuration for multiple channel applications. Signal conditioners can be remotely located by up to 100+ feet to facilitate LVDT linear position sensor operation in extreme environments.

www.macrosensors.com/LVC_4000.html

Single-phase AC motor drives VE1 series

- Built-in EMC suppressor (first environment, category C2)
- Wide power supply 200...240VAC
- Integrated potentiometer
- Integrated control panel
- Output frequency 0...650Hz
- 8 preset speeds with independent acceleration and deceleration time
- Built-in RS485 communication port (Modbus®-RTU)
- V/f curve configuration
- Sequencer (frequency/time cycles)
- Analog input 0...10V or 0/4...20mA
- Analog output 0...10V programmable
- Integrated PID
- Setup software standard supplied with VE1.

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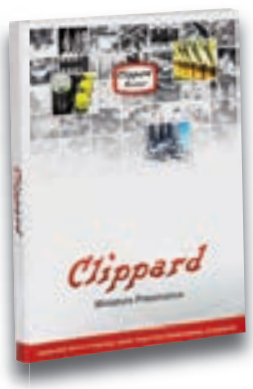

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