

EUREKA

THE MAGAZINE FOR ENGINEERING DESIGN

In this issue: Sensors, Test & Measurement • Rapid Prototyping • Drives, Controls & Automation

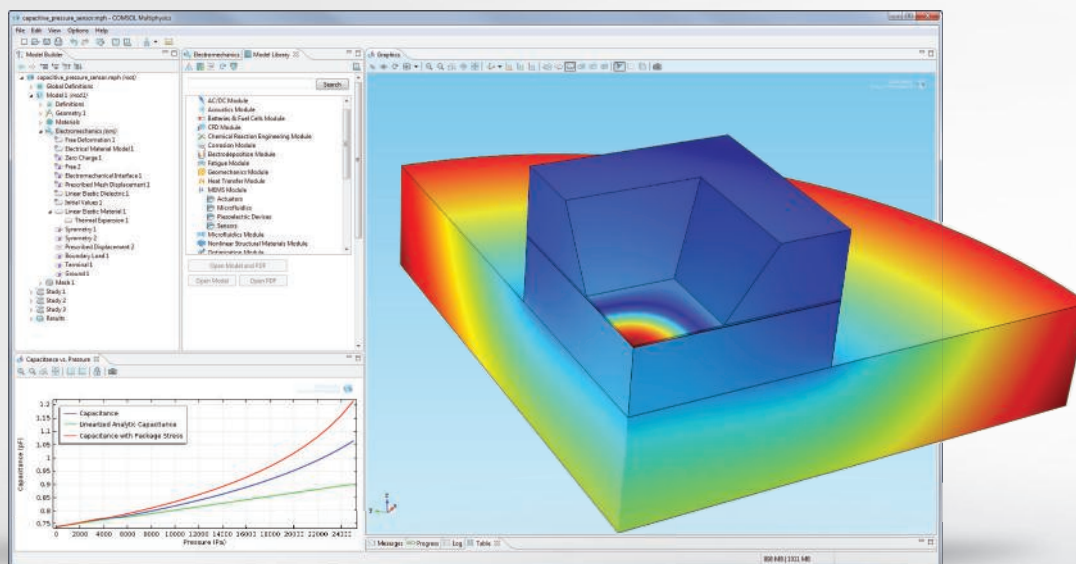
The shape of things to come?

Building intelligence
into the next
generation
of robots

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THIS ISSUE:
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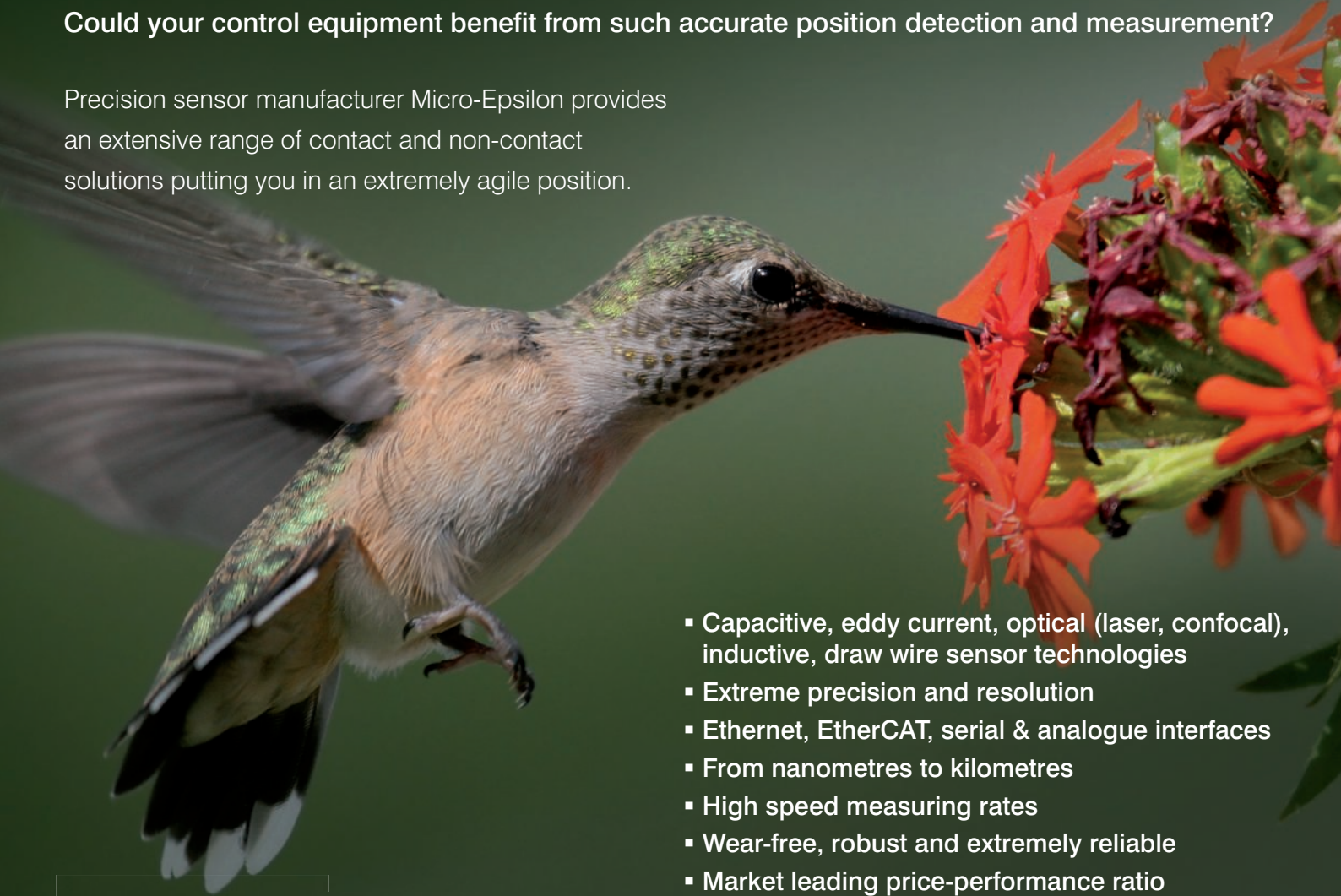
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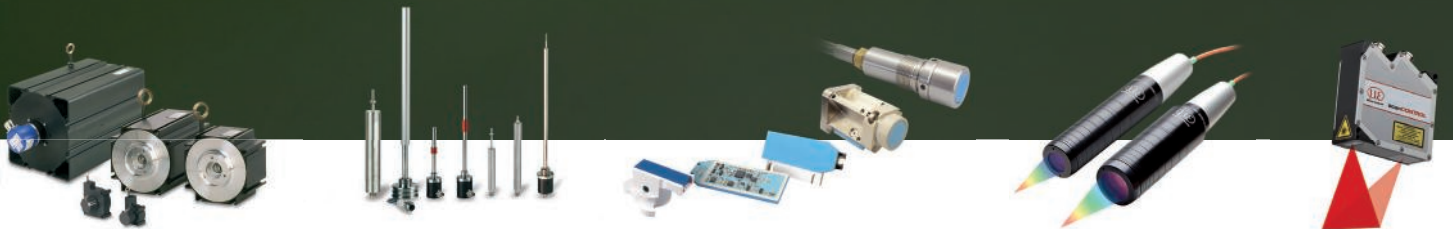
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So what's in it for you?



Paul Fanning, Editor (pfanning@findlay.co.uk)

As the briefest glance at this month's *Eureka* will probably already have told you, this is the magazine's Engineering Design Show Preview issue.

In addition to carrying the Show Preview (which begins on page 23), this is also the issue of *Eureka* that will appear at the Engineering Design Show on the 2nd and 3rd October at the Ricoh Arena, Coventry. Indeed, it is entirely possible that you are reading these words at the event itself. In which case: welcome and thank you for coming – you won't regret it.

Of course, there may be some of you who may currently have no plans to visit. That, of course, is your prerogative. We understand how precious your time is and know only too well how hard it can be to find time away from your office for events like this.

However, you may want to consider a couple of things that may go some way towards changing your mind.

The first – and probably most important – thing to remember, is that your rivals are likely to be there. They will therefore get the benefit of seeing the people, products and services on who are – for these two days only – all under one roof.

Still not convinced? OK, well how about this? There is no other exhibition in the UK designed specifically for design engineers. The Engineering Design Show is unique in that regard and if you think it may not be of interest, all I can tell you is that if you receive and read *Eureka*, the show is directly relevant to you.

The other thing, of course, is that this is not just a show about selling products. Far from it, in fact. This is a show intended to inspire its visitors, which is why it includes a high-level Conference featuring speakers from some of the biggest names in UK engineering design. These speakers – who hail from companies as diverse as Dyson, Jaguar Land Rover and Surrey Satellite Systems, will offer insights on design from their sectors of industry that we hope will inspire and encourage visitors to apply new thinking and approaches in their daily work. In addition, the show will feature highly practical, detailed workshops hosted by experts in technologies with which *Eureka's* readers deal every day.

As I say, *Eureka's* readers are very busy people, but if there is ever a good reason to take a day away from your desk, the Engineering Design Show is it.

I very much hope to see you there.



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Nissan to deliver first autonomous vehicle by 2020

With help from some of the world's leading universities, including MIT, Oxford, Stanford and the University of Tokyo, Nissan is working to ready a commercially-viable autonomous vehicle by 2020.

In fact, the Japanese automotive giant says it will offer several Autonomous Drive models upon launch, and will spread autonomous capabilities across its entire range within two model generations, which should be less than a decade.

It also wants to offer the technology at a 'realistic price' for consumers.

"In 2007 I pledged that – by 2010 – Nissan would mass market a zero-emission vehicle," says Nissan CEO Carlos Ghosn. "Today, the Nissan LEAF is the best-selling electric vehicle in history.

Now I am committing to be ready to introduce a new groundbreaking technology, Autonomous Drive, by 2020, and we are on track to realise it."

Work is already underway in Japan to build a dedicated autonomous driving proving ground, which is due to be completed by the end of 2014. This will be used to push vehicle testing beyond the limits possible on public roads and ensure the technology is safe.



Universities must share IP, says engineering chief

The outgoing president of the Institution of Engineering and Technology (IET) is calling for more universities to give SMEs open access to their IP.

"Tax payers are already funding the creation of innovative intellectual property in our universities, so it seems reasonable that more of this is made available to SMEs that are best positioned to add value and commercialise it," commented Professor Andy Hopper.

He continued: "Universities should be encouraged and incentivised more to kick start the development of new technologies and products by openly assigning the required IP to dynamic British businesses at minimal extra cost. In return, maybe the university could get a one or two per cent shareholding – more of a goodwill gesture than a conventional transaction. This is all perfectly possible and is happening in a number of UK universities already."

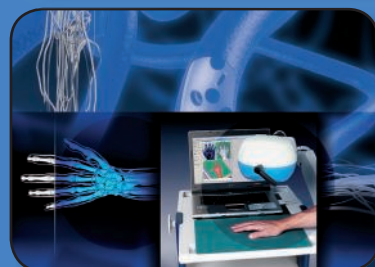
Professor Hopper believes this will be a big

boost for the engine room of the UK economy, as well as small- and medium-sized enterprises.

He is also calling for more engineering advisers to be embedded in Government.

"In the UK, engineering is still undervalued despite our rich industrial heritage and track record in pioneering new technologies," Prof Hopper noted. "This is reflected in the make-up of the government and must change to help turn around the UK economy."

"With the success of so much future policy based around engineering and technology, I believe that it is time for the government to draw more on the knowledge and experience of the UK's best engineering talent at the highest levels."



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Boeing rolls out first Dreamliner 787-9



The second member of Boeing's 787 family rolled out of the company's Washington-based assembly plant last week, after clocking up close to a thousand orders.

The twin-engine, twin-aisle 787 Dreamliner is the first major aircraft to make heavy use of composite materials and, according to Boeing, it uses 20% less fuel and has 20% fewer emissions than other planes in its class.

Approximately 20ft longer than the 787-8, the 787 also boasts higher cabin pressure and humidity, larger windows with electrochromic smart glass and a cruising speed of Mach 0.85 (567mph, 490knots, 913km/h).

The first aeroplane is expected to make flight tests in the coming weeks as it is prepared for final delivery.

Desktop 3D scanner unveiled

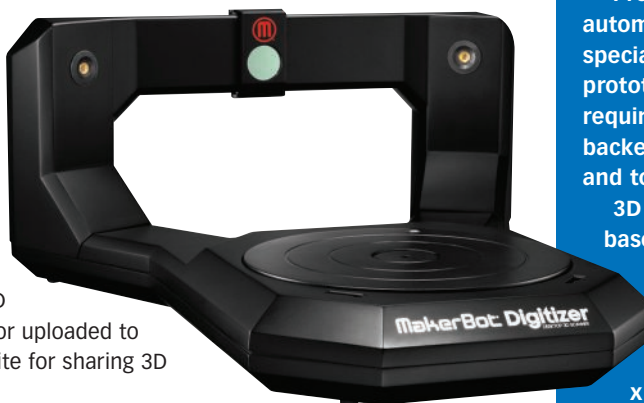
Makerbot has taken the wraps off a new device which lets users scan objects so they can be replicated using a 3D printer.

The Makerbot Digitizer, which costs \$1,400 (£900), works by pointing several lasers at an object up to 8in in height or diameter and detecting contours in the surface.

After around 12 minutes of scanning, the measurements can then be sent to a 3D printer to print out or uploaded to Thingiverse, a website for sharing 3D designs.

"The MakerBot Digitizer is for early adopters, experimenters and visionaries who want to be pioneers in Desktop 3D Scanning," said Makerbot in a statement. "This includes, but is not limited to, architects, designers, creative hobbyists, educators and artists."

A demonstration of the Digitizer is available in the video below. For more info, visit <http://store.makerbot.com/digitizer.html>.



3D Systems acquires CRDM

3D Systems has acquired CRDM, the leading UK provider of 3D printing, rapid prototyping and tooling services for industry.

Providing services for industry across sectors including automotive, aerospace, medical and defence, CRDM specialises in delivering high quality components for prototype, pre-production and full production requirements, from our bespoke 22,250 sq ft facility, backed up by 18 years of experience in rapid prototyping and tooling industries.

3D Systems will quickly integrate the High Wycombe based company into its global Quickparts Solutions custom parts and manufacturing services.

In the coming months, CRDM will benefit from continual new investment in equipment; including an sPro 230 SLS system with a 550mm x 550mm x 750mm build envelope as well as a second large bed iPro 8000 SLA machine. CRDM will be in a much better position to support all of the current and future prototyping and low volume manufacturing requirements of our customers and prospects.

www.crdm.co.uk

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New adapters combine perfectly

MiniTec has extended its modular linear positioning system range with newly developed precision adapters that facilitate the actuators to be combined easily and economically to form multi-axis systems. Applications such as material handling, packaging, pick-and-place, material testing, marking or laser machining can be handled flexibly and precisely. The new adapters are suitable for fastening MiniTec's profile system guide rails onto slides as well as slides on slides. With adapters having datum edges, extensive adjustment of the system is not necessary.



MiniTec linear guides can be delivered as components, ready for installation, or may be supplied as complete assemblies including drive and control units and application programming. System design may be carried out by the customer using MiniTec's iCAD Assembler software.

www.minitec.co.uk

Plastic parts power wind turbines

Plastic parts from igus UK are being used within wind power applications from the development stage right through to the final production unit.

Common problems within wind power plants are not only the noise pollution that is generated, but also the high maintenance requirements of the turbines themselves. igus parts however differ from the generic standard mechanical parts due to technical properties such as self-lubrication, resulting in smooth operation and low noise. The iglidur PRT dry-running slewing ring bearing can be used for high torques over any diameter and its plastic iglidur J sliding elements are maintenance and lubrication free.

A suitable solution to guiding cables within rotary movements is the RBR (Reverse Bend Radius) energy chain, which allows rotary movements of up to 540°. Also, the cables are kept compact and protected inside the machine.



At the core of the wind turbine another versatile product from igus is the Twister Band energy chain which can be used in installations either horizontally or vertically. It provides uninterrupted rotations of up to 7,000° and circular motions in small spaces.

www.igus.co.uk

Rotary drive sets new standards

Festo has launched a new cost-effective semi rotary drive with twin pistons that offers excellent precision, stiffness and loadability. Using an innovative bearing system, the DRRD actuator can handle higher loads with exceptional accuracy, enabling engineers and OEMs to improve the performance of their equipment.

In addition, integrated external shock absorbers increase the maximum mass

moment of inertia by up to four times compared with previous technologies. As a result, engineers can move higher loads with greater dynamics or specify a smaller drive to move the same load, therefore saving space and cost in their machine.

The new DRRD actuator combines the bearing and flange into one functional element and as such features a larger bearing size giving increased stiffness of the whole product. The rotary



drive provides torque up to 110Nm and rotation up to 200°. In addition, it has a mid-position so it can be stopped at any angle between 0 and 90°, thus increasing flexibility for machine builders.

www.festo.co.uk

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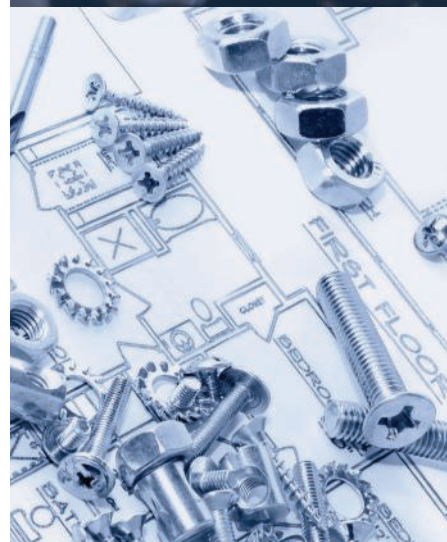
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R. A. Rodriguez is KHK's European master distributor and via its growing distribution network, industry in the UK and wider Europe has a speedy and comprehensive source of supply for this extensive range of stock gears.

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qualities to suit a variety of rotary-to-linear and linear-to-rotary motion requirements.

These precision gears are available in 500, 1000 and 1500 mm lengths, with metric tooth pitches from modules 0.79 to 12 and with soft, case-hardened or induction-hardened and ground racks. Teeth are finished by hobbing or grinding and in square or rectangular section. Special profiles are also available as a standard option.

www.rarodriguez.co.uk

Solution to last month's Coffee Time Challenge

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The solution to August's Coffee Time Challenge of how to cut down on noise from neighbouring diners in restaurants comes from The Woolly Shepherd; a natural acoustics company based in Somerset, responsible for creating a unique, sound absorbing wool cloud, specifically designed to soak-up unwanted reverberations so that people can enjoy a more peaceful dining experience.

These innovative clouds are the only natural material eco-solution on the market and utilise the properties of 100% natural wool in combination with other sustainable, low impact materials to create high-performance alternatives to industry standard, highly processed mineral and oil-based products.

Having been installed previously at a variety of leading restaurants and schools, community centres, businesses and homes, including several prestigious National Trust properties, Woolly Shepherd is also already the holder of a Platinum-level national sustainability award from London-based Think.Eat.Drink, and has been nominated for a Yeo Valley Business of the Month award.

Jamie Grainger-Smith of Think.Eat.Drink enthuses: "It really is amazing how discarded wool can function in such an effective manner. These clouds absorb everyday restaurant noise flawlessly, and help mould the acoustics of most restaurants to contribute to the right atmosphere and ambience for customers; minimising any unwanted noise. The success of the product also signifies a growing need for modern sound absorption techniques, benefitting not only restaurants but all types of events."

Woolly Shepherd director Tim Simmons concludes: "We are particularly pleased to be

recognised for our work in the field of sustainable business. We work hard to source our raw materials from ethical, UK sources wherever we can. We also create extremely low levels of waste and see no conflict between successful business and ethical trading. Let's hope our clouds are as warmly received at this year's RHS Hampton Court Palace Flower Show, as they have been in the restaurant world."

www.woollyshepherd.co.uk



Hardide Coatings solves hard chrome plating problem

Hardide Coatings has developed a revolutionary alternative to toxic hard-chrome plating (HCP) which will soon be restricted or banned.

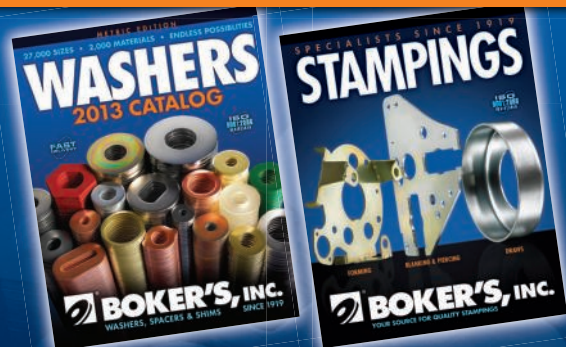
Hardide-A meets strict new EU and US environmental standards and provides comparable wear, corrosion, hardness, surface finish and substrate bonding properties to HCP. Unlike most HCP alternatives, Hardide-A is also suitable for internal surfaces and complex shapes.

The company has successfully completed the first of two test phases to approve Hardide-A as a replacement for HCP on an application for AgustaWestland, and, if successful, the Hardide coating will be approved for use on a specific AgustaWestland helicopter rotor blade component. The helicopter manufacturer is also considering other applications for the Hardide coating technology.

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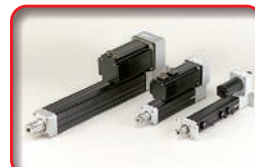
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A World of Motion CONTROL

Super human?

The only thing the Atlas Robot is missing is intelligence – but not for long.

Paul Fanning finds out about the process of building a brighter robot.

On-board real time
control computer

Even for the less fanciful among us it is difficult to greet the news that the world's biggest defence contractor is working on a six-foot, 300lb humanoid robot with autonomous capabilities without at least a flicker of alarm. After all, memories of the 'Terminator' films are now so culturally ingrained that they are hard to shake. And, as we know, the advent of such machines in those films did not end well for the human race as a whole, so we can perhaps be forgiven the odd shiver.

Of course, in these publicity-conscious days, one would assume that Lockheed Martin (the defence contractor in question) would fight shy of such an invidious comparison..in which case, one would be wrong. The company's press material relating to the robot in question cheerfully describes it as looking "like it could star in the Terminator films", a sentiment that, while eye-catching, is hardly designed to settle the nerves.

However, all is not as sinister as it might seem. In fact, the Atlas Robot was not developed by Lockheed Martin, being a robotic

hardware platform developed by Boston Dynamics with US Defense Advanced Research Projects Agency (DARPA). It is a hydraulically-powered robot in the form of an adult human capable of a variety of natural movements, including dynamic walking, calisthenics and user-programmed behaviour. It has 28 hydraulically-actuated joints with closed-loop position & force control

Atlas was modified to meet the needs of the DARPA Robotics Challenge. The DARPA Robotic Challenge is predicated on a disaster response scenario and focuses on developing robots that can operate in rough terrain and difficult conditions, using aids (vehicles and hand tools) commonly available in populated areas.

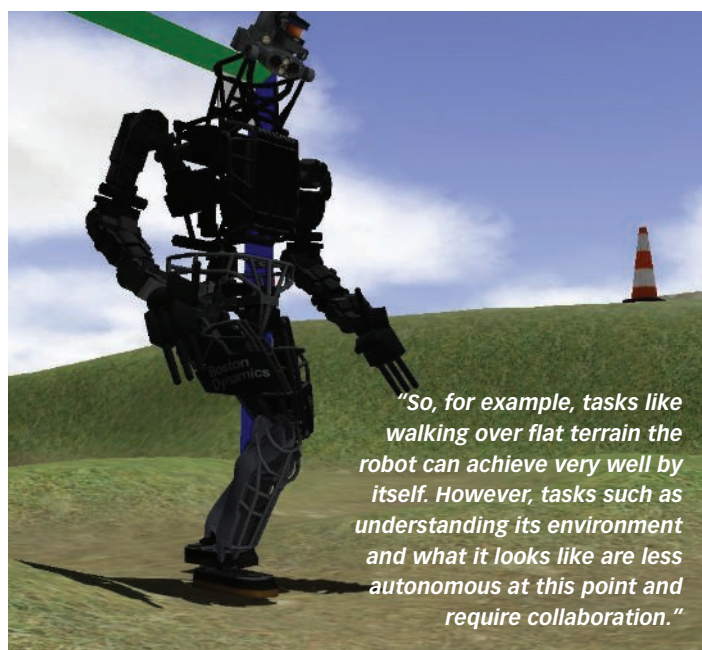
More specifically, the Challenge is designed to prove that the following capabilities can be accomplished:

- Compatibility with environments engineered for humans (even if they are degraded)
- Ability to use a diverse assortment of tools engineered for humans (from screwdrivers to vehicles)
- Ability to be supervised by humans who have had little to no robotics training.

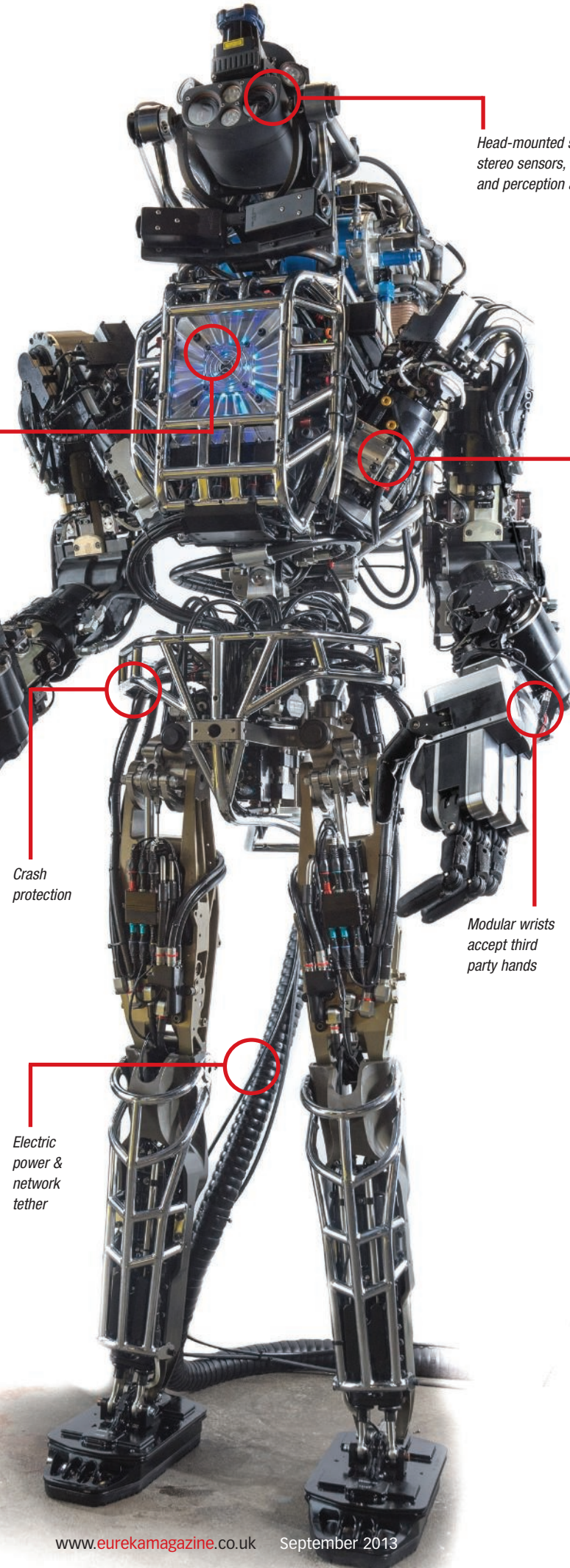
A number of teams entered this competition, going on to compete in a 'Virtual Challenge' in which their control software was applied to certain tasks in a simulation environment. These tasks included: walking over increasingly difficult terrain; picking up a hose from a table and connecting it to a standpipe; and finally, approaching an all-terrain vehicle, use the robotic platform to drive through a course and then exiting the vehicle.

One of the teams to have passed this stage and to have taken delivery of the Atlas robot was from Lockheed Martin's Advanced Technology Labs in conjunction with the University of Pennsylvania and Rensselaer Polytechnic Institute. And, as Bill Borgia, director of the Intelligent Robotics Laboratory at Lockheed Martin Advanced Technology Laboratories points out, this chimed with much of the defence company's existing research in this area.

"One of our long-term interests is to develop robots that can operate in highly-complex, human-engineered environments...The Challenge aligned very well with what we were working on already," he says. "We see robotic systems expanding into environments that



"So, for example, tasks like walking over flat terrain the robot can achieve very well by itself. However, tasks such as understanding its environment and what it looks like are less autonomous at this point and require collaboration."



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are much more complex and much less predictable than those in which they currently operate. The kinds of technologies required to compete in the Robotic Challenge are very, very well aligned with where our organisation is going."

Naturally, having to adapt its technology to fit a platform such as Atlas that Lockheed did not develop is a challenge, but one that Borgia sees as a positive. "We don't know what the robots that will be developed in the future are going to look like. This is simply the first of many platforms where we will apply our techniques to controlling. As we expose our technology to additional platforms, we'll learn more and more about how to control them."

'Supervised autonomy' is a critical element of the Challenge, as it allows simple tasks to be performed by the robot without full-time operator intervention. This will be especially important in unreliable communications environments. Says Borgia: "The level of autonomy is heavily dependent on the nature of the task. There are some tasks that have a high level of autonomy because they're very predictable, but there are other tasks where the human has to collaborate with the robot to help it understand what outcome the human desires.

"So, for example, tasks like walking over flat terrain the robot can achieve very well by itself. However, others, such as understanding its environment and what it looks like, are less autonomous at this point and require collaboration."

The tasks outlined by DARPA's challenge involve robots going into a complex industrial facility and using human tools to perform actions that humans could otherwise not perform. So, for example, they are looking at tasks such as clearing rubble, opening doors, climbing stairs and ladders and breaking through a concrete barrier.

Clearly these tasks present a lot of opportunities for developing new technologies. For example, building a robot that can pick up and operate a drill involves a lot of close co-operation between sensing, perception, planning and control of the robot.

However, according to Borgia, the key to the development process does not lie in simply attempting to anticipate the tasks the robot will be asked to perform and programming it accordingly. He says: "If we try to anticipate all the scenarios, we'll ultimately end up building a solution that works in those scenarios, but may prove not to be adaptable to others. We're in the business of building systems that we want to be broadly applicable."



One of the biggest issues facing the team is therefore to identify what the right trade-offs are between anticipating specific scenarios and trying to build a system that is highly adaptable. Says Borgia: "One of the things we do as engineers is to identify instances that may exist across multiple scenarios and implementing them in certain ways whereby they are broadly applicable."

"So, for example, turning cylindrical objects such as valves comes up a number of times in the robotic challenge. But the process of opening valves is not that different to turning a steering wheel in the driving task. Those processes are broadly similar and we can aggregate them in such a way that the same technology can be applied."

Of course, ever-greater autonomy for the robot is a key aim in the longer term and, by familiarising the robot with certain tasks and allowing it to adapt these capabilities in alternative scenarios, ever greater autonomy becomes feasible. "The more linkages we can make between potential tasks, the higher the capability that exists for performing those tasks autonomously," says Borgia.

Nonetheless, the heart of the project remains the collaboration between the robot and the human operator. "Ultimately," says Borgia, "the human and the robot will work together not to replace the human, but to enhance the human's capability and becoming a trusted remote partner to accomplish tasks he could otherwise not perform."

"It's a highly dynamic and unpredictable environment, so however well we might try to model that environment, there are still going to

be objects and situations that we didn't anticipate. Those situations will also change over time, so the robot can plan some of those actions upfront, but the human remains a crucial partner to help the robot understand the outcomes that will complete the mission."

In terms of the likely level of autonomy he believes the robot may be able to achieve, Borgia insists that will be intrinsic to how critical such autonomy is to the mission in hand. He says: "Ultimately, our goal is to help then operator to accomplish his mission. If there are cases where the operator cannot do that by himself, we want to be able to apply autonomy to accomplish his mission."

Of course, the big question remaining is over the areas in which such technology may be applied. Given Lockheed Martin and DARPA's involvement, it doesn't take a great leap of imagination to suggest that this technology's ultimate destination will be military in nature, but this is by no means the only application.

Says Borgia: "As a technologist, I'm fascinated by the potential multitude of applications. I liken it to the PC revolution. It was difficult for the engineers of that time to foresee all the potential applications, but once they got them into the hands of the users, the application space really exploded."

"With the Challenge, we'll put the Atlas into the hands of trained disaster responders, but as it continues to become exposed, many more domain experts will be able to identify potential applications for the technology going forward."

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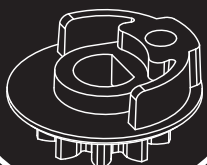
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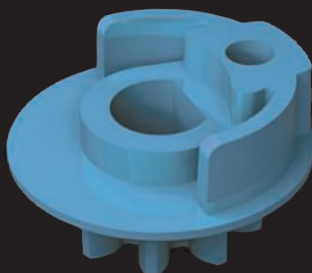
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Transforming forces

Jim Heppelmann, CEO of PTC, believes there are seven defining 'forces' that are changing the way manufacturing businesses operate. **Eureka** finds out what they are.

Manufacturing business worldwide is undergoing a transformation in product, in process and in the very definition of manufacturing. Those that don't keep up are likely to find themselves outpaced.

Jim Heppelmann, president and CEO of the systems and software group PTC, counts seven different but related "forces" that he says are coming together to create what he calls "a history-defining moment".

Hype? Well, Heppelmann has influential backers such as The Economist who believe that on its own digitisation of product and process represents a new industrial revolution. But digitisation is just one of Heppelmann's seven interrelated game-changing forces: "Each of them taken singly would be a big deal," he says. "The sum of them is completely transformational."

Digitisation is in fact the starting point for Heppelmann, and for manufactured products it started with the capture of geometry in computer-aided design (CAD), which reduced errors intrinsic in drawings and sketches. Digital product data, he says, has become the "DNA" of manufacturing.

"But there's plenty more benefit to come from digitisation," Heppelmann says. Technologies such as 3D printing point towards a redefinition of the whole manufacturing process, and the digital product information is now used as the basis for service operations such as installation and maintenance.

But digitisation has done more than just produce its own direct effects: it has also fostered other business changes that are among Heppelmann's seven transformational forces. Globalisation, for example, has some of its roots in universal air travel and the development of the internet, but digitisation is a trend that has, he says, "torn down geographical and economic boundaries".

In the past, companies could decide whether to operate locally or nationally "but in many sectors that's not viable – businesses need to think globally," he says. Globalisation changes the whole process of innovation from the lone inventor to a collaborative approach based on worldwide information sharing: "The best companies design anywhere, build anywhere and sell and service everywhere," he says.

But if many products are now global, then the regulatory regimes that control the sale of goods are still far from uniform. Regulation, the third of Heppelmann's transforming forces, is a "strong headwind" buffeting the trend towards globalised products, he says. Governments, agencies and industry bodies impose rules that modify the free flow of goods; pressures such as environmental impact and employment conditions add new layers of compliance for manufacturers to meet.

Differing regulations mean that the idea of a single uniform product in

every market is viable for only very few commodity items: product variation, customisation and now personalisation are the fourth of Heppelmann's trends. Regional variations stem from many factors as well as regulations: customs, preferences, geography, history and climate.

Heppelmann says that the trend towards mass customisation of products has until now required a balance between customer demand for an individual product and the benefits of mass production. In some industries, such as automotive, it's been possible to meet these apparently conflicting drivers through a "platform" strategy in which the basics remain constant but the details are customisable through options and variants, though costs are usually passed on to the customer.

This is now changing. "Software inside products starts to break the rules," Heppelmann says. Smart phones are an example of products where "the last mile" of personalisation is done by the individual customer – and this will apply increasingly to other products, he says.

This is because of the fifth mega-trend that Heppelmann identifies: the incorporation of software into products that were previously mechanical. Embedded programmable software means that product performance can be modified to take account of changed circumstances: it redefines the conventional idea of a "product" that has a fixed purpose and a fixed method of delivering it.

Heppelmann's sixth transforming force is very much related to the software change: it's the degree to which products are now connected and can communicate their status and receive communications. What this means, he says, is that there is "a digital umbilical cord" between manufacturers and their products that extends right through the lifecycle. "It gives remote control and visibility: we can gather information on their usage and their performance and we can update them," he says.

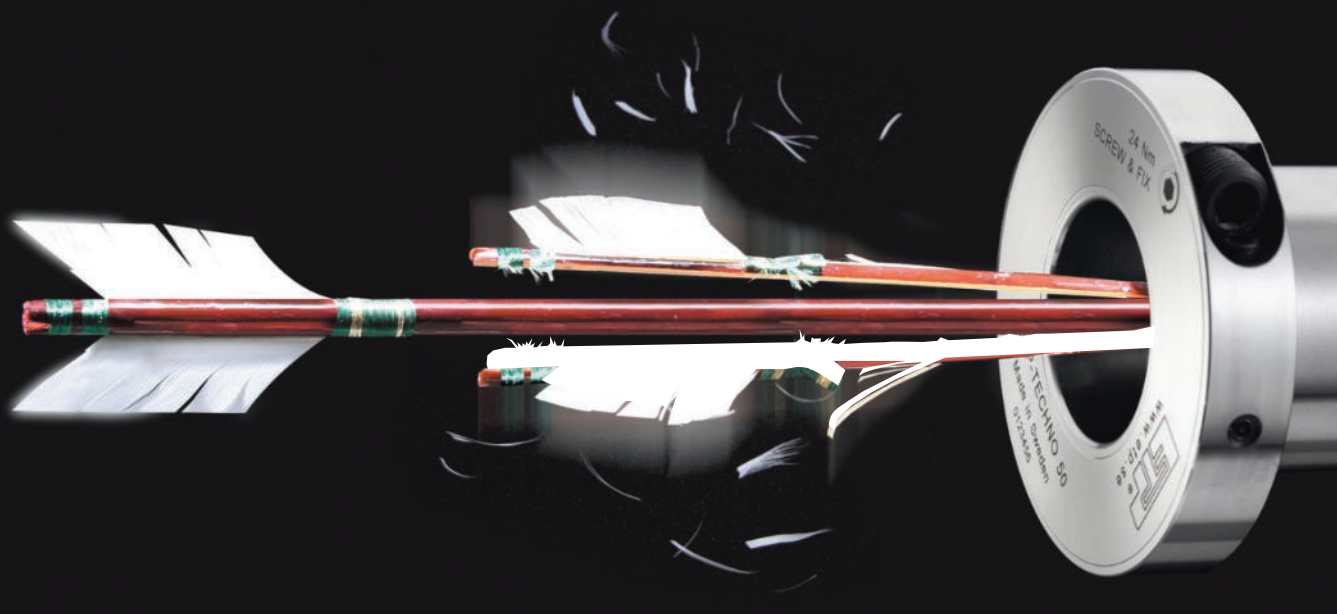
In terms of business, this breaks down the long-standing division between manufacturing and service. Putting all the data into one unified system fuels the last of Heppelmann's seven forces: it's called "servitization", and it is the trend for manufacturers to take responsibility not just for the supply of a product but also for its operation, maintenance and availability afterwards.

There are business drivers for this trend anyway: service represents a revenue stream that manufacturers have in the past not been tapping into – and in tough economic times, it's a missed opportunity. But Heppelmann believes that the trend also fundamentally changes the nature of what a customer buys. In aerospace, for example, servitization of aero-engines means that airline customers no longer buy an engine as such; instead, they are buying engine availability as the manufacturers take on responsibility for service.

www.ptc.com

"But there's plenty more benefit to come from digitisation. Technologies such as 3D printing point towards a redefinition of the whole manufacturing process, and the digital product information is now used as the basis for service operations such as installation and maintenance."





ETP makes the right connections

If you require a coupling that saves you time, space and money, ETP's hydraulically-actuated clamping bushes could be just what you need.

The need to save time and space while improving performance are constants throughout the engineering industry. With these requirements in mind, the traditional mechanical clamping bush suffers a number of key disadvantages from the user's point of view.

The first of these is that these traditional methods of connection rely on bolts to secure the shaft. This is problematic enough when installing them, but even more difficulties are posed when maintenance or adjustment are required and the bush has to be removed. In these situations, the securing bolts need to be undone painstakingly, half-turn by half-turn.

This process is time-consuming and laborious in the best of conditions, but in demanding environments such as oil rigs, where the operator may be working in appalling weather conditions and possibly at night, the time and difficulty involved becomes a truly critical issue.

The bolts used in such devices also pose significant problems in terms of design. This is because they require that any machine or

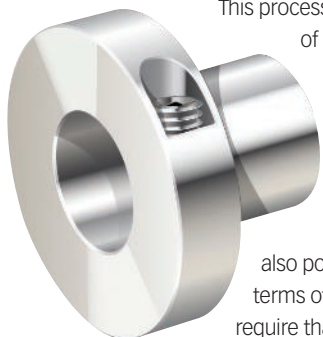
installation that incorporates them must allow space not only to accommodate them, but also for the operator or technician to access them for maintenance or adjustment. This can add significantly to the machine's footprint and can lead to compromises in other areas that reduce the efficiency or performance of the design.

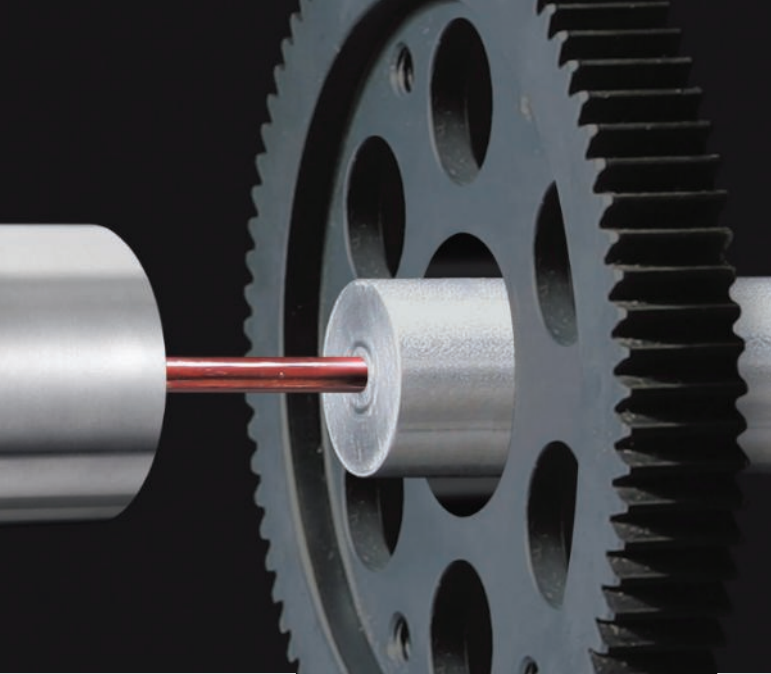
The answer to these problems is provided in the shape of the ETP hydraulically-actuated connections. These allow quick, easy and precise screw mounting in a multitude of applications by virtue of using a single screw for mounting and dismantling of the hub, thus ensuring an extremely quick and easy service interval time due to the easy adjustment of the hub.

This is achieved by the application of the principle of pressure propagation in liquids. This is hardly a new idea, having been formulated by Blaise Pascal in the 17th century. His 'principle of transmission of fluid-pressure' states that: "pressure exerted anywhere in a confined incompressible fluid is transmitted equally in all directions throughout the fluid such that the pressure ratio (initial difference) remains the same".

ETP products apply this principle by using a hydraulic pressure medium (usually wax or paste of some sort) confined in a double-walled sleeve. This is pressurised either using a flange containing one or more screws and a piston with seals for the pressure setting. The moderately-high pressure is distributed evenly along and around the hub and shaft, with the double-walled sleeve expanding uniformly and giving an even contact pressure against shaft and hub – thus effecting locking. The self-contained nature of the products means that this procedure can be repeated many times.

Regardless of whether hubs are being removed or repositioned, mounting and dismantling can be achieved in just a few seconds rather than the tens





of minutes that such a procedure might more usually take.

The benefits offered by the ETP's application of the hydraulic principle include approach include: compact design, fast mounting, ease of positioning and dismantling; good runout; and – because of the even pressure applied – no damage to or marking of the contact surfaces.

Ease of positioning comes about because, when the mounting process begins, the double-walled sleeve will come into contact with the middle of the area on the hub and shaft first. In this situation it is still simple to turn and axially move the ETP connection, around and along the shaft. The hub is therefore easy to position in the required location.

As pressurisation increases, the double-walled sleeve only moves radially towards the hub and shaft, meaning that the adjusted position will be accurately maintained.

The mounting of ETP connections usually requires only one screw to be brought to a low tightening torque. This connection can then immediately be subjected to a load, with no subsequent tightening of the screws required. In the case of larger shaft sizes of over 70mm-80mm, pressurisation is even easier because it is possible to use a hand pump to increase the pressure. This is simply connected, the valve is opened to enter the medium and closed to stop it, while the operator pumps it up to required pressure.

An additional benefit of this method is that, because the contact length onto the hub and shaft is long, the surface pressure can be kept at a moderate level. This means that the hub and shaft surfaces will not be damaged.

While many of the advantages of the ETP products are related to avoiding downtime, reducing maintenance costs and operator time, there are also additional

performance benefits. Not the least of these is the fact that the hydraulic principle, coupled with the accurate machining of the products makes the runout (axial and radial) and balance extremely good.

The surface pressure is equal both around and along the shaft and hub, which means that the ETP connections give a minimum of vibrations, lower noise level and good precision even at high rpm. Even with repeated mountings, the good runout will be maintained because of the hydraulic working principle.

The products available include Hydraulic Hub-Shaft connections. As names like ETP EXPRESS, ETP EXPRESS R, ETP POWER and ETP TECHNO suggest, these products are designed for a multitude of applications. In each case only a single screw is used for mounting and dismantling of the hub. This simple feature ensures an extremely quick and easy service interval time and incredibly easy adjustment or repositioning of the hub. The single screw hubs are used in a variety of applications and industries such as packaging, food, beverage and pharmaceutical. The standard ETP-TECHNO and ETP-EXPRESS are available for shafts 15mm to 130mm. ETP-EXPRESS R, Stainless steel versions, are available to suit shafts from 15mm to 80mm.

For larger dimensions and heavy loads, hydro-mechanical connections the HYLOC and HYCON series are available. These are a robust and compact

ETP's Advantages

- The Quick and Easy clamping of shafts
- The Quick release capability
- Strong and reliable clamping forces
- Precision tolerance bores with excellent run out
- Removes the need for keyways

design capable of transmitting high torque and radial loads. Designed to deliver reliability, withstand high loads and allow quick mounting and dismantling of large shafts, these are ideal for applications in difficult environments and heavy operations such as the steel and marine industry. Ideal for

applications with shaft sizes between 50mm and 220mm the installation and disassembly times are dramatically reduced compared to keyways or taper lock alternatives.

In addition, 'intelligent' connections such as the ETP-OCTOPUS are available. Here the pressure setting and mounting of the ETP product is done with the help of an external pressure source separate from the hub connection. This makes mounting very fast and also allows the simultaneous pressurisation of several connection. ETP also offers bespoke solutions.

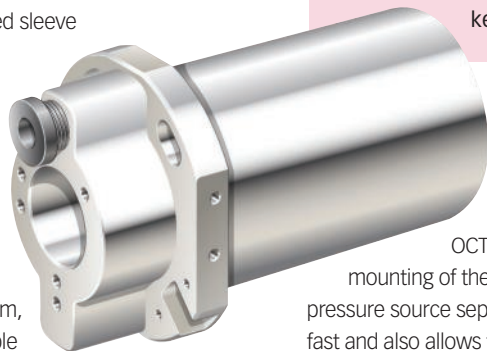
With increasing requirements on downsizing the machines, better runout/balance, increased machine speeds, shorter downtime for service and increased precision, the ETP hydraulic hub-shaft connections are chosen for more and more designs. If you feel they could be the answer to your design problem, contact:

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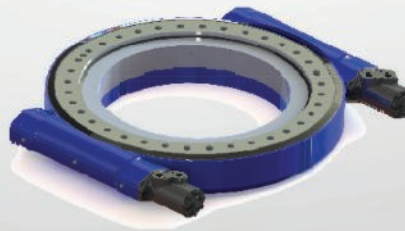
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Bigger and Better

This time last year, I wrote that the Engineering Design Show would offer “the perfect complement to Eureka’s editorial content”. Little did I know then just how right I was.

2012’s show proved a roaring success, attracting 1,600 design engineers to the Ricoh Arena, Coventry, to attend an event catering specifically to their professional needs. Exhibitors, too, declared themselves delighted, with the majority rebooking their stand for 2013 on the show floor. Meanwhile, the Conference programme attracted over 600 delegates and the Workshop sessions on the show floor were in some instances overflowing.

The unqualified success of 2012’s show vindicated the fundamental principle that underpinned its launch: that there was a real need for an exhibition devoted to design engineers’ professional requirements. Or, to borrow what has become the Show’s unofficial motto: ‘Designed for Design Engineers’

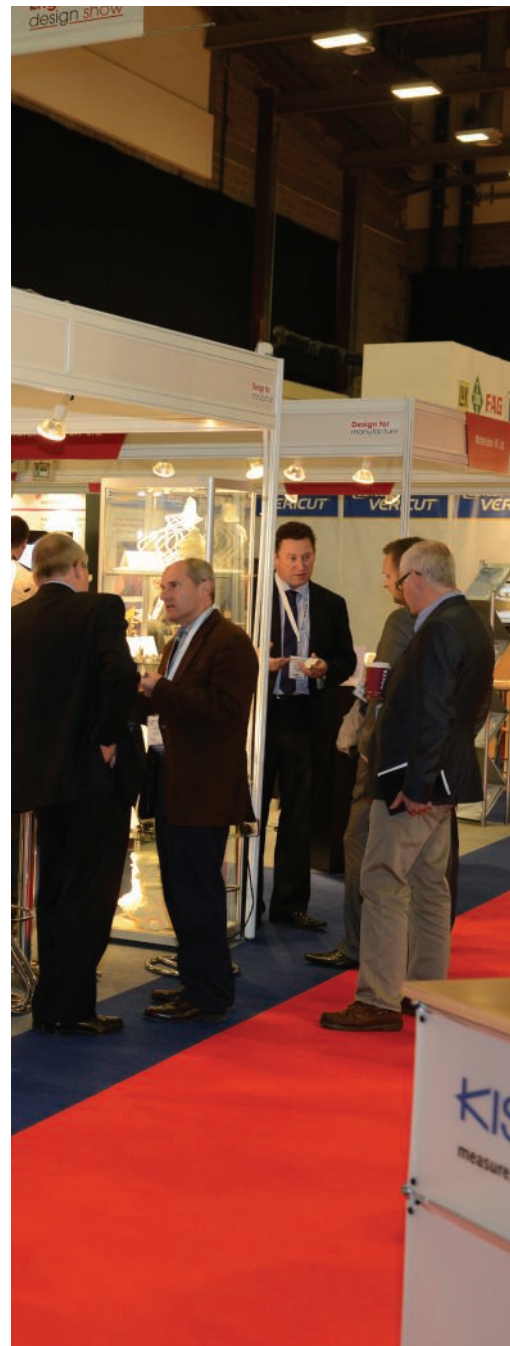
Almost before we knew how much of a success the 2012 show would be, however, the determination to build on it for 2013 already existed. ‘Bigger and Better’ have been this year’s watchwords and this is borne out by a show that will now take up all three halls of the Ricoh’s Jaguar Exhibition Centre, is co-located with the Electronics Design Show and will include a new section named ‘Engineering Materials Live!’.

This year, it is hoped that more than 2,500 visitors from all aspects of engineering design will attend, while around 200 exhibitors will be showing their wares. In addition, two Conference programmes will run this year for both the Engineering Design Show and the Electronics Design Show.

Given these factors, it seems clear that this year’s show will – as promised – be bigger and better in every way. Those of you who attended last year will find much, much more of the same, while those of you planning to attend for the first time are in for a treat.

We look forward to seeing you there.

Paul Fanning,
Editor



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The Conference Ones to Watch

There will be no shortage of outstanding content at this year's Engineering Design Show Conference. Here are just a few of the highlights.



The Dyson Way

Dr Caroline J Simcock CEng MEng & Man (Hons) EngD MIMechE MIED PMP

Dyson is synonymous with outstanding British design; the company prides itself on engineering products which work in different and better ways than their predecessors. Sir James is best known as the inventor of the Dual Cyclone bag-less vacuum cleaner, based on the principle of cyclonic separation; he is a design icon in his own right; championing engineering inspiring young minds. The Dyson design process starts with 'frustration'; looking at something and knowing that it can be improved. 'Wrong thinking' is another Dyson philosophy; keeping an open mind to new ideas and having no fear of failure.

The presentation will also cover a brief history of Dyson, Sir James' story and the Dyson design process.



Designing for Space

Andy Bradford – Director of Engineering, Surrey Satellite Technology

In this session, Andy Bradford will talk delegates through the challenges of designing these sophisticated systems to operate in the harshest environment of all.

Andy started his career in the space industry as a young graduate trainee at ESA ESTEC; during this time he played a major role in the 'TeamSat' mission, which was a small satellite designed and built mainly by students and young graduates.

Andy joined SSTL in 2000. His first role in SSTL was as a project manager, initially managing some closeout activities on the FedSat project. He went on to manage the BILSAT project from 2001 to 2003, and then the GIOVE-A project from 2003 to early 2006. After this Andy went 'back to his roots' to manage the Mechanical Systems Group, until August 2007 when he joined the SSTL leadership team, initially as Director of Projects, shortly afterwards

transferring to the role of Director of Engineering, which he has held since November 2007.

Specialise, Innovate, Outsource - the future for UK Design

Simon Benfield, Design Director for Ramboll UK and Chairman of the Institution of Engineering Designers

The UK design industry faces many pressures in the global marketplace. Decades of under investment and less than supportive education policies have left us with homegrown skill shortages, strong overseas competition and a reduced manufacturing base. This talk will consider the future for British engineering design and the approaches which industry are adopting, the merits of some of the approaches being taken, and the possible long term consequences.

The talk will primarily draw on experiences in the construction industry, but will draw out themes and lessons applicable to all.

It is intended that the audience will be drawn into a discussion and debate so that the viewpoints from different disciplines can be explored and to facilitate knowledge and best practice transfer between them.



The five principles of product development

Simon Smith, Associate Director - Products & Systems, Cambridge Consultants

Getting a product to market is hard, creating a successful product is harder. By storyboarding a consumer's journey, this talk will illustrate and discuss the five rules of innovation which make the difference to a successful product.

Simon Smith has more than 20 years' product development experience across a wide range of industries, specialising in the design of integrated mechanical products.

As a senior consultant, he is the technical authority at Cambridge Consultants for a range of novel consumer products – and has applied his aerosol expertise to a number of innovative personal care spray products currently in development.





Engineering Design Show



No exhibition is really complete without a strong conference programme. By offering the perspectives of leading engineers from across the industrial spectrum, the Engineering Design Show Conference will perfectly complement the more practical, day-to-day focus of the exhibition and Conference.

As the programme opposite makes clear, the Conference will offer delegates an unmissable opportunity to gain perspective on cutting edge technologies and strategies from some of the biggest names in UK industry. In addition, it will give a platform to some of this country's leading experts in fields ranging from additive manufacturing to satellite technology and advanced prosthetics.

Some of the names to conjure with at the 2013 Conference include Surrey Satellite Systems, Jaguar Land Rover and Dyson. In addition, this year's panel session will include some of the UK's leading experts in additive manufacturing giving a realistic and hype-free perspective on this hottest of engineering topics.

The delegate places for conference sessions are limited to 100 attendees per session. That said, they are going quickly, so haste is advised if you want to register for them. If you wish to reserve your place, then register now at www.engineeringdesignshow.co.uk to avoid disappointment.



2nd October 2013

Jaguar Suite

09:00-09:45

Developments in virtual design

*Andy Richardson, Head of Simulation,
Jaguar Land Rover*

10:00-10:45

The five principles of product development

*Simon Smith,
Associate Director - Products
& Systems,
Cambridge Consultants*

11:00-11:45

Designing for space

*Andy Bradford,
Director of Engineering,
Surrey Satellite Systems*

12:00-12:45

The Dyson Way

*Dr Caroline J Simcock,
Global Compliance and
Approvals Manager,
Dyson*

13:00-13:45

Brompton Bicycles: Riding High

*Will Carleysmith,
Head of Design,
Brompton Bicycles*

14:00-14:45

Reinventing the wheelchair

*Michael Phillips,
Design Development Director,
Renfrew Group International*



Conference Programme

To avoid disappointment and guarantee your place at any of these Conference sessions, register online at www.engineeringdesignshow.co.uk



3rd October 2013

Jaguar Suite

09:00-09:45

Defence and Aerospace keynote

10:00-10:45

Industrial design technology transfer

*Simon Benfield, Chairman
IED/Ramboll*

11:00-11:45

Additive Manufacturing: What's In It For Me?

Chaired by the Eureka editorial team

12:00-12:45

Driving Success

*Chris Aylett, CEO,
Motorsport Industry
Association*

13:00-13:45

Advances in robotic prosthetics

*Ted Varley,
Director of Development &
Operations,
RSL Steeper*

14:00-14:45

Solar-powered racing

*Cambridge University Eco
Racing*



Engineering Design Show

When it comes to innovation and product development, design engineers want practical demonstrations: the ability to see, touch and understand how a technology or process works. The 20 practical sessions provided within the two show floor workshop theatres do exactly that. With a diverse range of topics and technology areas, these free to attend seminars will allow engineers to understand how a new or existing technology, material or process can help them in their design projects. The workshops are free for visitors to attend, but space is limited to 50 attendees per session. If you are interested in attending one of the sessions listed below and wish to reserve your place, then register now to avoid disappointment at www.engineeringdesignshow.co.uk



2nd October 2013

Workshop Theatre - B115

10:15-10:55

Optimum bearing selection – Let's get the ball rolling!

*Dan Anderson, Applications
Engineer, Schaeffler (UK) Ltd*

11:15-11:55

Autodesk Industrial Machinery Solutions *James Smith, Autodesk Technical Consultant*

12:15-12:55

Lightweight polymer parts for demanding applications *Horst Heckel, i.V. Dipl.-Ing, Product Manager LFT, EMS-CHEMIE (Deutschland) GmbH*

13:15-13:55

Better materials data for CAD and CAE applications *Dr Arthur Fairfull, Product Director, Granta Design*

14:15-14:55

Engineering polymers: All you need to know *Professor Malcolm F Fox, R&D Associate, Nylacast*

Workshop Theatre - H5

10:15-10:55

3D Printing: Hype or Manufacturing Technology? *Jurgen Laudus, Director – Additive Manufacturing Solutions, Materialise*

11:15-11:55

Getting to grips with adhesives *Gavin Creech, Senior Applications Engineer, Scott Bader Company limited*

12:15-12:55

Don't screw-up multi- material joining! *Jeremy Scholefield, Director of Strategic Business, TR Fastenings*

13:15-13:55

Intellectual Property – A commercial perspective *Ian Harris, Partner, D Young & Co LLP*

Workshop Programme



3rd October 2013

[Workshop Theatre - B115](#)

10:15-10:55

Minimising vibration in high-speed ball bearing applications

Barney Eley, Application Engineer, The Barden Corporation (UK) Ltd

11:15-11:55

ProTec4 - an anti-counterfeit masterbatch

Greg Hammond, Technical

Director, Gabriel Chemie

12:15-12:55

Lightweight polymer parts for demanding applications

Horst Heckel, i.V. Dipl.-Ing, Product Manager LFT, EMS-CHEMIE (Deutschland) GmbH

[Workshop Theatre - H5](#)

10:15-10:55

Creating synergy by connecting processes

Norbert Ott, Product Manager, Aucotec AG

11:15-11:55

A guide to industrial imaging

Thomas Karow, Sales Manager, The Imaging Sourcing Europe GmbH & Ian Alderton, Sales Director, Alrad Instruments Ltd

12:15-12:55

Oxford to Minsk on a pint of petrol

Ian Bell, Senior Sales Engineer, maxon motor and Peter Armstrong, DPhil Student, University of Oxford

13:15-13:55

RS Components – Product Launch

Exclusive new product launch by RS Components



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Features & Innovations

The 2013 Engineering Design Show will include a range of features and exhibits designed to demonstrate innovation and engineering excellence. Here, we take a look at what's in store to whet the appetite of visitors.



Dyson's Ball™ Technology

A cutaway explaining Dyson's Ball™ technology will be just one of the company's exhibits at the show. Ball Technology makes steering easier. The glass-reinforced polypropylene ball provides a protective space in which the motor and its components sit.

Positioning this heavy part further down also lowers the machine's centre of gravity, reducing weight in hand and improving manoeuvrability further.

Brompton Bicycles

Designed and built in the UK, the Brompton is a folding bike that rides superbly, is safe, agile and fast, yet folds easily and quickly into a highly-compact and portable package. The result is a vehicle that increases your sense of freedom and independence.

Finely-engineered and elegant, the Brompton has a full-sized frame, made mainly of steel for strength and stiffness. It is designed to be practical and light enough to be genuinely portable. A selection of these British design classics will be available to view at the Ricoh Arena.

RSLSteeper – Operating Bebionic hand

Leeds-based RSLSteeper will show its award-winning Bebionic 3 hand at the Engineering Design Show.

RSLSteeper is a leading international manufacturer of upper extremity prosthetic products. The bebionic hand is the latest addition to its product portfolio and is claimed to be the most advanced prosthetic hand available on the market.

Renfrew Group – Chair 4 Life

Renfrew Group, in partnership with the NHS has developed an innovative children's wheelchair 'Chair 4 Life' to improve the quality of life for disabled children and young adults.

The Chair4Life (C4L) initiative was developed by the NHS National Innovation Centre (NIC) in response to clear statements of clinical need from users, carers and health

experts. The priority need was identified in the Department of Health's 'Innovation Health & Wealth' report to create a specification for a wheelchair that would be easily adaptable for a growing child.



TRB Structures – BAC Mono and Lightning GT

On show this year will be these two cutting edge cars. The Mono uses carbon fibre composite construction over a steel chassis (with FIA compliant rollover structure).

The Lightning GT is a technological tour de force, with leading edge components and advanced engineering employed throughout.

National Instruments – LabVIEW for Lego Mindstorms

This demo will show how LabVIEW for Lego Mindstorms was designed specifically for use with the LEGO Education robotics platform, providing a sophisticated teaching tool that helps students programme the Lego Mindstorms NXT brick.

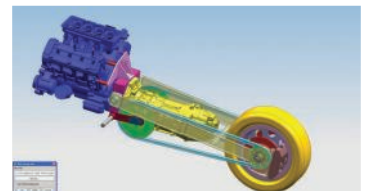
Premier EDA Solutions/Altium – Angelic Bulldog

The Angelic Bulldog is a motorcycle with a difference – it is intended to travel at 400mph and break the world outright motorcycle land speed record.

Meet project leader Gabriel Uttley at the show and take a look at the vehicle he intends to ride into the record books

Premier EDA Solutions/Altium – CUER

The Cambridge University Eco Racing team will be taking part in the World Solar Challenge in Australia with its car Resolution during the show. However, members of the team will be available at the Show to discuss the technology underpinning this effort, as well as showing Endeavour, the car that took part in 2011's event.



Electronics show completes the picture

This year, the Engineering Design Show will not be a standalone event. For the first time, it will be co-located with an event aimed specifically at the electronic design engineer.

The Electronics Design Show came about because the reception from exhibitors and visitors alike for last year's inaugural Engineering Design Show was such that organiser Findlay Media decided the event merited expansion. This year's event will therefore not only occupy three times the area of last year's show, it will also include a section devoted specifically to the electronics sector.

The Show will provide exhibitors and visitors alike with the opportunity to take part in an event aimed exclusively at electronic design engineers. Phil Mayo, managing director of headline sponsor Premier EDA Solutions, said: "We see the Electronics Design Show as a superb platform for highlighting innovation from the UK electronics industry. It will also provide an ideal and compelling opportunity for visitors to view and experience the capabilities of Altium's electronic design automation products.

"We share a common passion with Findlay Media for the success of UK engineering and are very much looking forward to showcasing some of the fantastic technology designed using our products at the exhibition."

Meanwhile, Findlay Media is pleased to welcome Avnet Memec as a headline sponsor. "Avnet Memec is delighted to be supporting the inaugural Electronics Design Show, which will be bringing innovation, learning and cutting edge technology to the UK's design engineering community," said Chris Shipway, Avnet Memec country manager. "We are looking forward to working with the EDS team to make this the 'go to' event



*Phil Mayo,
managing
director, Premier
EDA Solutions*

for design engineers in the UK."

As well as seeing technology from more than 80 exhibitors in Hall 2 of the Jaguar Exhibition Hall at the Ricoh Arena, visitors to the Electronics Design Show will also have the opportunity to access best practice learning and practical design ideas through conference and workshop sessions.

The Electronics Design Show conference will provide 16 sessions during the event's two days, while the workshop programme will offer 20 practical and technical sessions.

The Conference will focus on the requirements and realities of design electronics within the UK. With a wide ranging agenda, the conference will bring together high profile speakers from industry and academia.

Design engineers will be able to book a pass for the whole conference or for individual sessions, allowing them the opportunity to plan their visit to the show to fit exactly to their requirements.

Meanwhile, free-to-attend seminars – being held in two show floor theatres – will allow engineers to understand how new or existing technologies, materials or processes can help them in their design projects. Amongst those companies who will be presenting workshops are ams, Analog Devices, D Young and Co, Freescale, TDK-Lambda, XJTAG and Zuken. Joining Premier EDA Solutions and Avnet Memec as headline sponsors are Digi-Key, RS Components and Altium.

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Drew Cadman

SELMOUR KIT, SALES DIRECTOR
VISITS THE DESIGN OFFICE...

DESIGN OFFICE

Drew - the gripper design is looking good. Only one thing - It's too heavy. It needs to be lighter.

Hmm! There must be an easier way to determine this. I know! I can search my new EPDM vault to find the weight.

DESIGN OFFICE

DREW SEARCHES THE SOLIDWORKS EPDM VAULT

Now I need to find the heaviest part...
SEARCH FIELD = WEIGHT

THE VAULT'S MAGIC!

OH!

...so I can reduce the weight. The vault can tell me the material costs, so I can cut costs too. Phew! quite a lot to do before running a simulation.

GO WHAT'S NEXT?

THIS WAY

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nt CAD SOLIDWORKS

Hi Drew. You need SolidWorks Simulation Professional. Also, I'll book you onto the Simulation Training Course.

Next, simulate the design. Wow! There's so much in SolidWorks Premium. Will it do what I need? Help! I know, I'll call...

WHO'S HE GONNA CALL?

THE SIMULATION IS A SUCCESS!

A FEW DAYS LATER...

SIMULATION REPORT SAYS YES!

Ahha! SolidWorks Simulation Professional has verified my design optimisation. The gripper arm was too heavy.

Simulation report says good to go! I'll email Selmour. NTCAD/CAM saved the day!

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Show and Sell

**What will be filling the stands at this year's Engineering Design Show?
Here, Eureka offers a taster of what will be exhibited at the Ricoh Arena
from 2nd-3rd October.**

Abssac Stand E35

Abssac will be showing its full range of precision lead screws and nuts at the Engineering Design Show. As one of the only suppliers on the market to truly offer a miniature lead screw product, Abssac overcomes significant technical obstacles and once again manages to supply what other lead screw manufacturers cannot.

Abssac has expanded its lead screw ranges to incorporate the machining facility to supply any type of thread

form that you may require. In fact Abssac can supply screws up to 120mm diameter and up to 3m long can also be supplied. Combine this with the ability to offer further journal end machining, gun drilling, screw hardening and special coating treatments, gives Abssac a competitive edge.

Alrad Stand G10

Alrad plans to show many new products this year. Exhibiting in conjunction with The Imaging source, the Imaging Division at Alrad will be showing a wide range of products including the extensive range of industrial CCD and CMOS cameras from The Imaging Source including cameras with USB3.0 Vision, USB2.0 and Firewire outputs as well as autofocus and board cameras.

A new addition to the Alrad stand this year will be the New Imaging Technologies WiDy wide range infra red camera which incorporates an InGaAs photo array with a spectral response from 900nm to 1700nm. Also on display will be the latest range of image sensors from CMOS Sensor Inc and Dynamax Imaging.



In addition, from its Photonics Division, Alrad will show a range of components that includes everything from the Coherent Stingray lasers, Dexter infrared thermopiles and Reynard Optical filters (for operation between 400 nm and 9.5 microns) to Prisms, mirrors, windows, flats, retardation plates and beam splitters, as well as custom coatings.

ASM Stand: F5

Sensor specialist ASM will show the new WB61 Tape Extension Sensor, which provides up to 4000mm measuring length in a compact housing. All ASM Tape Extension Sensors have been designed to operate in harsh conditions, making them a perfect choice for the mobile working Machine Market as well as other harsh, demanding applications.

Due to the design of the sensor and the inherent strength of the stainless steel tape they can be found in environments and areas where other sensors struggle to survive, such as hard to reach areas where directional changing pulleys are used or where temperature extremes cause problems such as icing. The life of its range of Tape Extension Sensors is totally unaffected by the use of pulleys which makes them the perfect choice for safety critical areas often found in crane operation or the mobile working market in general.

Anixter Component Solutions Stand D92

Leading UK component solutions company Anixter Component Solutions will be featuring its extensive range of fastening solutions, as well as wire termination products and cable sealing components at The Engineering Design Show.

A wide range of fasteners, as well as wire and cable



Engineering design show

components will be on display at the Engineering Design Show. Anixter Component Solutions provides a 'hands-on' approach on the stand, demonstrating its products with a pick 'n' mix display. This provides designers and specifiers with the opportunity to investigate individual products, and often provides inspiration in solving fastening and cable management challenges.

The stand will be staffed by an expert technical team, who will be on hand to offer application and material advice. In addition, visitors can take away a free copy of Anixter's 300-page product catalogue, a vital tool for all designers and specifiers in the electronics industry.

Aucotec Stand F 35

Integration will be the topic of the software provider Aucotec at the Engineering Design Show 2013. The company will be highlighting the advantages and latest developments, which are based on the particular openness of its database-driven system Engineering Base (EB).

The German system developer will present connectivity of external systems such as the PLM Software Team Center (Siemens) or Agile (Oracle) as well as the time-saving link with the process control system tools from ABB (800xA) and Siemens (PCS7). EB's integration of various industry standards such as VEC, ISO 15926 or eClass will also be an important topic.

Barden Corporation Stand C45

For the second year in succession, The Barden Corporation UK will be exhibiting at the Engineering Design show. At the 2012 show, Barden co-exhibited with parent company Schaeffler. Following the success of that show, this year Barden will have a separate, complementary stand adjacent to the Schaeffler stand.

Visitors to the Barden stand this year will have the opportunity to view a range of super precision ball bearings, working models and cross-sectional displays across a selection of typical applications, including dental handpiece turbines and turbomolecular vacuum pumps. Experts from Barden will be on hand throughout the show to provide advice and guidance on bearing selection, or to discuss specific application issues.



EMS-Chemie Stand G70

EMS-Grivory metal replacement products Grivory GV & Grivory HT have been used with great success for some time now for the substitution of cost-intensive die-cast metal parts. Further advances using Long-Glass

reinforcement have been supplemented with carbon-fibre reinforced materials which are characterised by maximum stiffness, even at low component density. At the Engineering Design Show & Workshop seminars EMS-Grivory will highlight the advantages when designing and manufacturing parts with Long Fibre reinforced materials.

EPLAN UK Stand D6

At the forefront of electrical computer aided engineering software solutions, the company offers fully-integrated engineering tools that reduces design time considerably. EPLAN software allows for efficiency in the engineering design process, whilst ensuring consistent project data across all disciplines. This reduces design time considerably and minimises the chance of errors.

On-stand activities will include software demonstrations held on a one-to-one basis and mini presentations for your group if required.

Henkel Stand E25

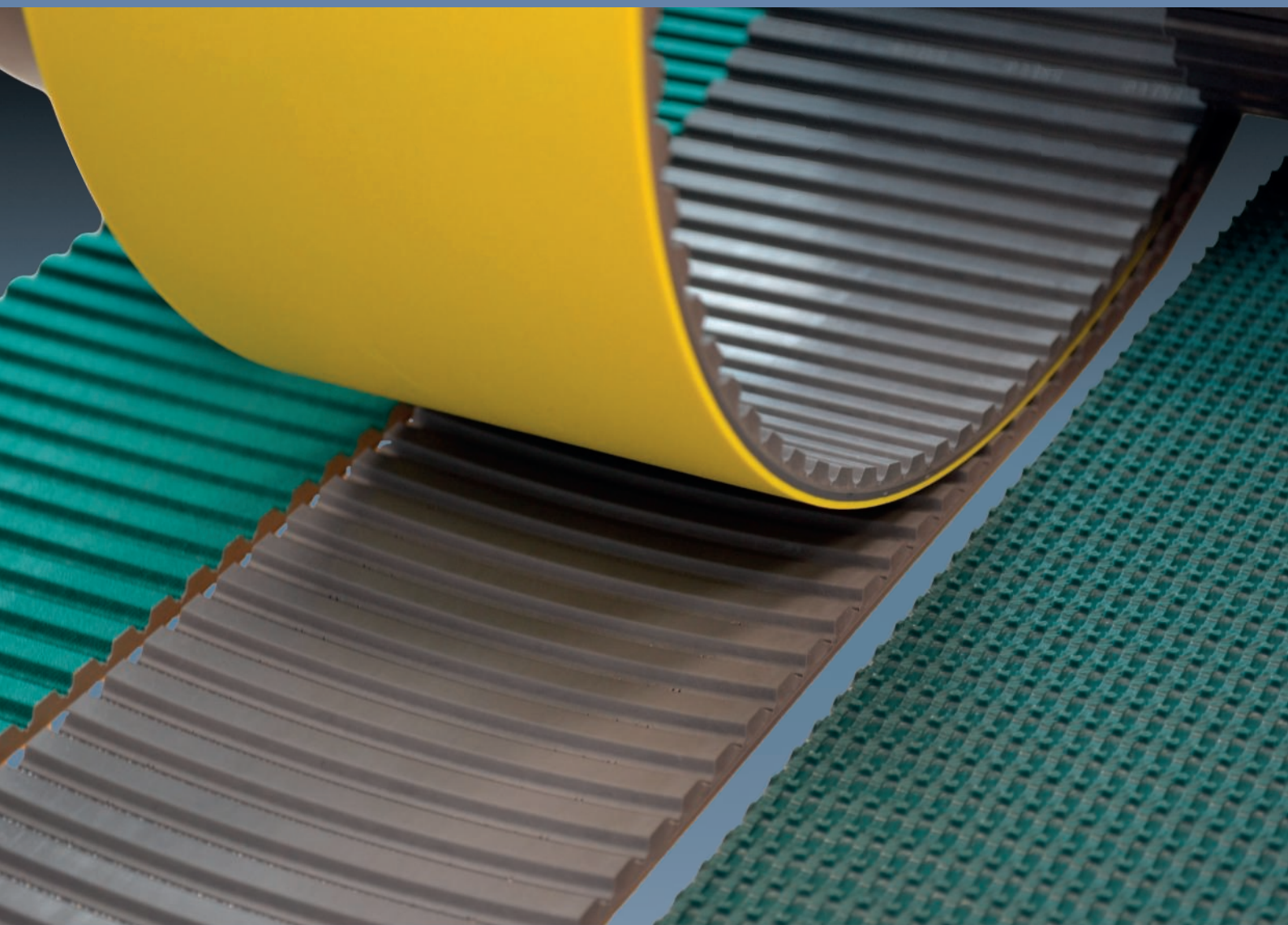
At this year's Engineering Design Show Henkel is focusing on the aesthetic quality of adhesives. Two products in particular exemplify this important element as both are crystal clear. They include a new silicone, Loctite 5700, an encapsulating compound that has been developed for tasks such as sealing energy efficient LED arrays, advertising signs, illuminated lettering and other outdoor applications. It is a highly transparent, two component silicone which offers good adhesion on a wide range of substrates such as metal, glass and plastics.

The other addition is a clear version of the proven Macromelt hotmelt overmoulding compounds. This Henkel moulding concept is highly cost effective. As low pressures are involved, lower cost mould tools can be employed. This also allows delicate components to be encapsulated or enclosed.

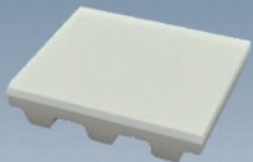




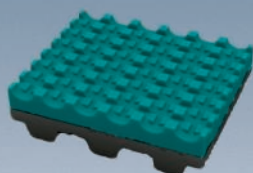
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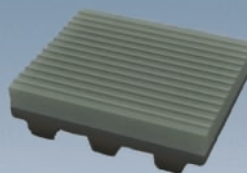
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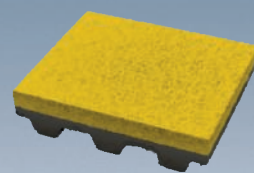
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igus UK Stand D10

Leading polymer specialist, igus UK, will be showcasing its new high performance tribo-polymer bearings, energy chains and cables at Engineering Design Show, on stand D10. Visitors to the stand will be able to see live demonstrations of its industry-leading maintenance-free products including new stock plates, xiros ball bearings and robolink robotic system, which are cost-effective and reliable solutions for designers and engineers. In addition, igus will be showing its range of xiros bearings. Available in five standard igus materials, the xiros range of bearings is ideal for a variety of applications, ranging from medical equipment, pumps and measurement machines, through to transport and conveying technology – particularly in the industrial sectors of chemicals, food, laboratory equipment and packaging.

Another highlight on igus' stand is robolink, a simple, lightweight and cost-effective robotic system, which is now available with six degrees of freedom.

Man and Machine Stand F55

During the show Man and Machine will be hosting a workshop covering Autodesk Industrial Machinery Solutions at 11am on

2nd October. Attendees will earn how strategic improvements to processes enabled with Autodesk technology will result in winning more business,

leading in new product development, and growing overall revenue and profitability. This will be shown through industry specific case studies and a product demonstration.

Throughout the show Man and Machine's sales team will be on hand to answer any questions and talk about the services it offers as an Autodesk Platinum Partner including training and consultancy. Highly skilled technical consultants will also be available to demonstrate the latest 2014 Autodesk software and answer any technical questions.

man machine

National Instruments Stand G25

The new NI cRIO-9068 software-designed controller will be highlighted this year. It is part of the most advanced and open system design platform for embedded control and monitoring systems. Completely redesigned, but maintaining full LabVIEW and I/O compatibility with the CompactRIO platform, the controller integrates state-of-the-art technologies including the Xilinx Zynq-7020 All Programmable system on a chip (SoC), which combines a dual-core ARM® Cortex-A9 processor and Xilinx 7 Series FPGA fabric.

Also on show will be LabVIEW 2013, which focuses on

three primary areas: integrating access to the latest technologies that make systems better; enhancing the environment so developers are more efficient; and providing access to an ecosystem of training and partner tools. Meanwhile, the NI CompactDAQ platform is a rugged, modular data acquisition system that provides sensor and electrical measurements on the benchtop, in the field and on the production line.

Ogle Models Stand G42

At The Engineering Design Show Ogle Models and Prototypes invites you to try the Laser Sintering strength test, on the stand it will have sample dog bone swatches for you to handle and see how robust additive manufacturing / industrial 3D printing really is. Ogle will also be launching its range of seven colours for impregnating laser sintered parts, the advantages of which will be greater strength and flexibility and longevity of the finish compared to painted parts. Ogle will also be putting on a game of quoits using dyed Laser Sintered parts, get two over the pole to win a highly-valued sample.

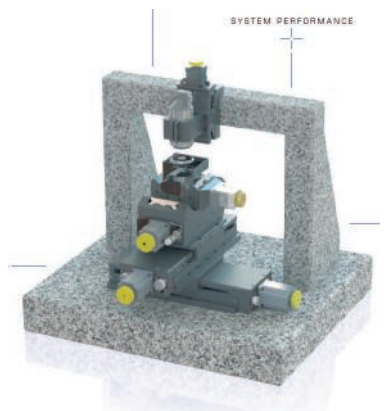
Laser Sintering (LS) is an accurate, well developed powder based AM process that can be used for both prototyping and small batch production applications without the need for expensive tooling. Parts can be built in a range of nylon materials. A distinct advantage of Laser Sintering is that it is fully self-supporting and can build highly complex geometry. Ogle has worked with laser sintering for many years and is considered highly competent.+



PI Stand F100

On display at the Engineering Design Show will be examples of PI's capability, including the new Quartz and Topaz multi-axis controller platforms. Designing and building a multi-axis motion system where precision is required involves the careful selection of mechanical components, such as bearings, screw thread, motor and encoder, for each individual axis.

PI's new Custom Motion Systems, based in the UK can help by providing multi-axis positioning solutions, taking an initial concept through the design, manufacturing and test phases to final delivery.



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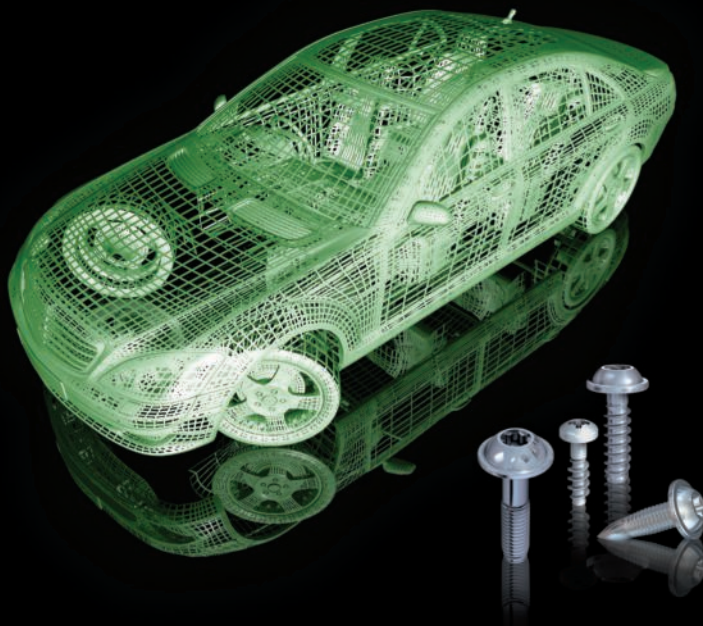
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Engineering design show



Proto Labs Stand G50

Proto Labs will be attending the Engineering Design Show, 2013, where for the first time, visitors to the company's booth will be able to view live and try out a demonstration of the ProtoQuote and FirstQuote online quoting system.

Proto Labs has established itself as the world's fastest source for custom CNC machined and injection moulded parts delivered in as little as one business day. Since inception the company has invested unceasingly in both technology and people, building a world-class, innovative service for designers and engineers across Europe.

Proto Labs' innovative online quoting systems, ProtoQuote (for injection moulded parts) and FirstQuote (for CNC machined parts) are a cost and manufacturability analysis quotation system accessed via the company's websites. After loading a 3D CAD part, customers receive a clear, simple and non-technical quote, incorporating costs, material choices and where appropriate suggestions for changes to parts in order to improve manufacturability and/or tooling and part cost.

RUD Chains Stand E10

RUD Chains will present a range of its latest products and innovations at the show. One area of focus will be its range of

lifting and lashing applications, offering over 270 different tested and certified lifting/lashing points, 210 of which are for bolting and 60 for welding, used across a wide range of working environments.

As well as these, RUD will be showing its latest Innovation, RFID technology. Being one of the first manufacturers offering the RFID chip embedded into an application, RUD is at the forefront of this technology.

Another of RUD's innovations is the WBPG 85-200 tonne hoist ring for heavy-duty engineering, used for heavy engineering, offshore and construction projects. The VLBS-U-LT 2.5t welded load ring another new innovation, offers a major distinctive feature operating to temperatures as low as -45°C perfect for many offshore, Arctic offshore and specialised construction projects.



Micro-Epsilon Stand C35

At the Engineering Design Show, precision sensor manufacturer Micro-Epsilon will present an innovative range of sensor technologies, including non-contact eddy current and laser displacement sensors, infrared temperature sensors, thermal imaging cameras, draw wire sensors, and



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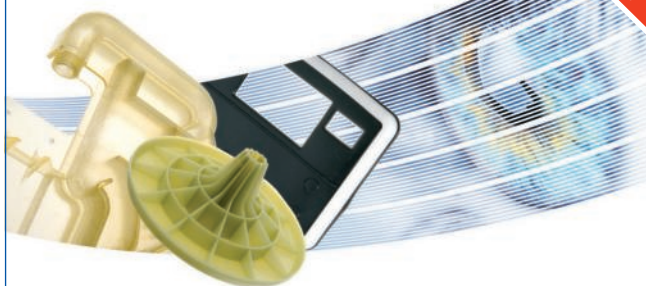
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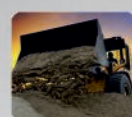
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Engineering design show

colour recognition sensors.

To encourage visitors to interact with the products, the stand will stage a number of 'live' working demonstrations, where sensors will be set up to capture measurements from a variety of real-world applications. Visitors will also be invited to take part in Micro-Epsilon's 'Sensor Challenge' to test their knowledge of the various non-contact measuring techniques.

Highlights of the stand this year include the new scanCONTROL 2600/2900, the latest innovation in the company's range of 2D/3D laser profile scanners. Other highlights include the eddyNCDT 3100 displacement sensor and the latest thermoIMAGER TIM 450 inline infrared thermal imager



Scott Bader Stand F40

Scott Bader will be exhibiting again at this year's Engineering Design Show 2013 in Coventry. Whether it is information on Adhesives or Advanced Crestapol resins, experts will be available on the stand to answer your questions and to provide you with any additional technical product information you require.

In addition to the stand itself, Gavin Creech, Senior Applications Engineer will be giving a talk on 'Getting to Grips with Adhesives' which takes place on 2nd October 11.15-12.50 in Workshop Theatre H5.

Techdrives Stand F15

Techdrives will present a wide range of essential components for rotary and linear machine drives. These include Panasonic drive products with standard AC, brushless and servo motors. Linear motion products cover electric actuators, screw jacks and ball screws. Experienced Product Engineers on the stand can advise on the selection of these products,



One highlight at the Show is the new Panasonic MINAS brushless motors and drives. These offer reduced dimensions, reduced energy consumption and even reduced prices compared to previous models. Accurate speed holding is possible over a range of 133:1. The KV variant gives servo-like performance at a low cost with 4000r/min motors in a power range 50 to 750W, ideal to upgrade stepper drives.

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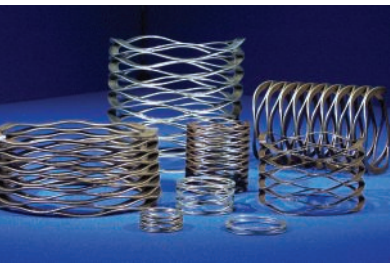
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Engineering design show



TFC Stand F30

Extensive examples of TFC's Smalley products will be on display, including our new standard range of over 200 sizes of Linear Expander which are a continuous wave formed wire length produced from spring tempered materials that acts as a load bearing device along a straight line.

Since all TFC's products are produced by 'edge-winding', they can be manufactured with short lead times but without expensive tooling costs. They are ideal for small prototype production demands or for high volume requirements and are available in a wide range of materials.

TFC's technical staff will be on hand to discuss general and specific enquiries and to provide expert advice on specifications, materials and design-in problems.

TR Fastenings Stand G90

TR Fastenings will be presenting an overview of its extensive portfolio of products, licenses and services at the show, including its own branded range of sheet metal fasteners, its plastics range for PCB hardware and Cable Management plus its extensive range of drives. TR Fastenings owns the

Pozidriv trademark for the UK, Pozi in the EU, as well as the MATHread and Torx licences and has recently come to an agreement with Phillips Screw Company whereby it will manufacture, under licence, Phillips' complete range of industrial drive systems. These include the recently introduced Mortorq Super Spiral Drive Recess, which provides customers with the ability to reduce head height and save weight.

Ultrapolymers Stand F20

Ultrapolymers will showcase its extensive range of industry leading engineering materials and comprehensive technical and commercial services at the Engineering Design Show. Visit the Ultrapolymers' Material Support Centre to discuss: effective material selection, specification, improved part performance, process optimisation and cost positioning with their experienced technical team. Whether you are looking for metal replacement, weight reduction, impact modification, transparency, colour, improved stiffness or specific additive packages find out how Ultrapolymers' range of materials and services can benefit your application or design.



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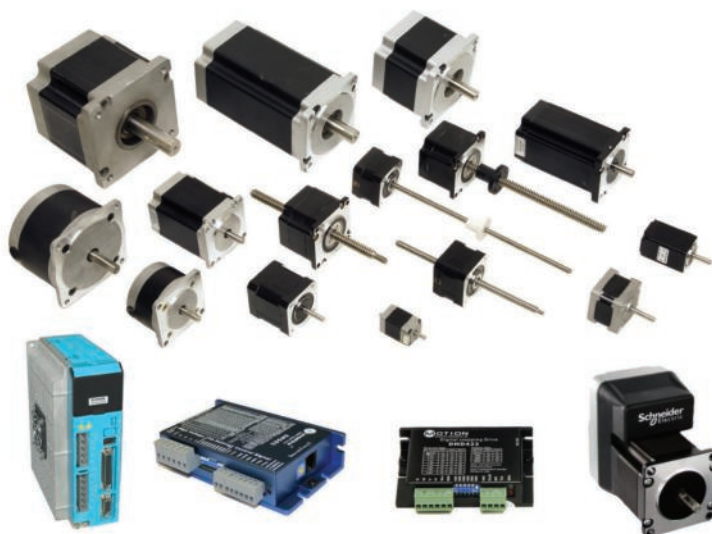


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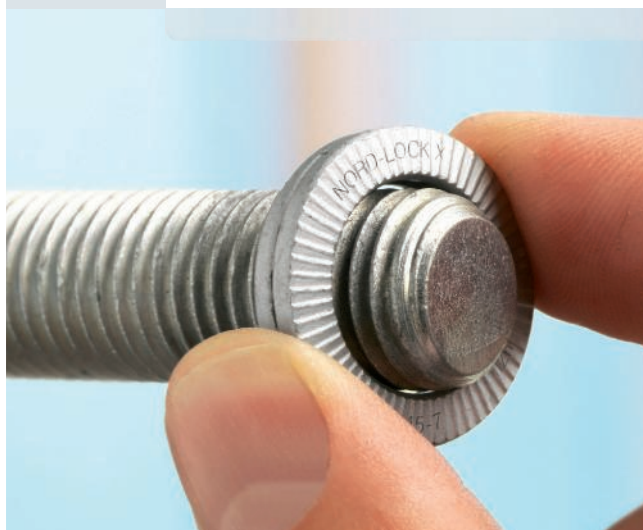
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Engineering design show

Variohm EuroSensor Stand D105

Since last year's show there has been a number of developments within the Variohm group. In addition to the continued growth and development of our comprehensive range of Position, Pressure, Temperature, Load and Vibration sensors. Variohm has purchased Herga Electric Ltd, a leading UK manufacturer, designer and exporter of footswitches, hand controls and sensing solutions for medical equipment and industrial control applications.

Established over 60 years ago and they have developed a comprehensive range of electric and pneumatic actuated foot and hand switching controls that meet a wide range of international approvals including IEC/UL 60601. With extensive manufacturing facilities including plastics moulding and electrical assembly, the Company has also pioneered switching solutions using infra-red and Bluetooth technology.

D Young & Co Stand H55

On 2nd October, D Young will present its first workshop 'IP – A Commercial Perspective', discussing the important aspects of IP when taking a product from conception to market. This was one of the most popular workshops at the

show in 2012. It will give frank and practical consideration to the pitfalls and opportunities of using IP in your company, as well as advising how to avoid infringing other people's IP rights, and what to do if another party threatens your company with its IP.

On 3rd October it introduces the UK Patent Box – the UK government scheme that allows companies to apply for a lower rate of corporation tax to profits earned from patented inventions. The Patent Box came into effect on 1 April 2013 and is a scheme any innovative UK company should be aware of. We'll

talk you through the ins and outs of how to qualify for the scheme, and how to calculate what savings (if any) you should expect.

Throughout the event, D Young & Co attorneys and solicitors will be available to provide practical, commercially focused IP advice to those who visit its stand.

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Heidenhain GB Stand D5

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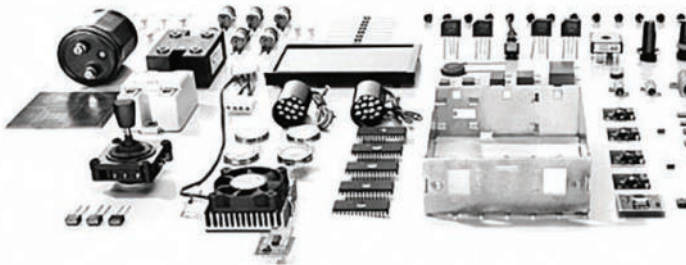
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RS Components Stand J18

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electronic components and industrial products, the company supports more than 1.6 million customers worldwide, supplying components to research and development or maintenance engineers. Its product range includes semiconductors, connectors, capacitors, resistors, LEDs, relays, switches, indicators and power supplies – a huge range of electronic components. RS also provides free technical advice and information on RS products from over 60 technical engineers as well as access to over 110,000 datasheets, ensuring that customers get the support and advice that they need.



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Schaeffler (UK) Stand D25

The Schaeffler Group is one of the world's leading engineering businesses, employing 76,000 people worldwide at 180 locations and generating sales of €11.1 billion in 2012. The family-owned concern maintains its leading edge by constantly developing products and services to meet the specific needs of its customers. Over 6,000 staff worldwide are involved in R&D, with the company registering over 1,600 patents every year.



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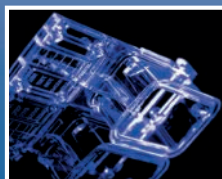
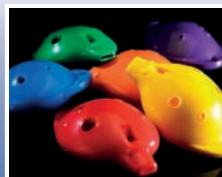
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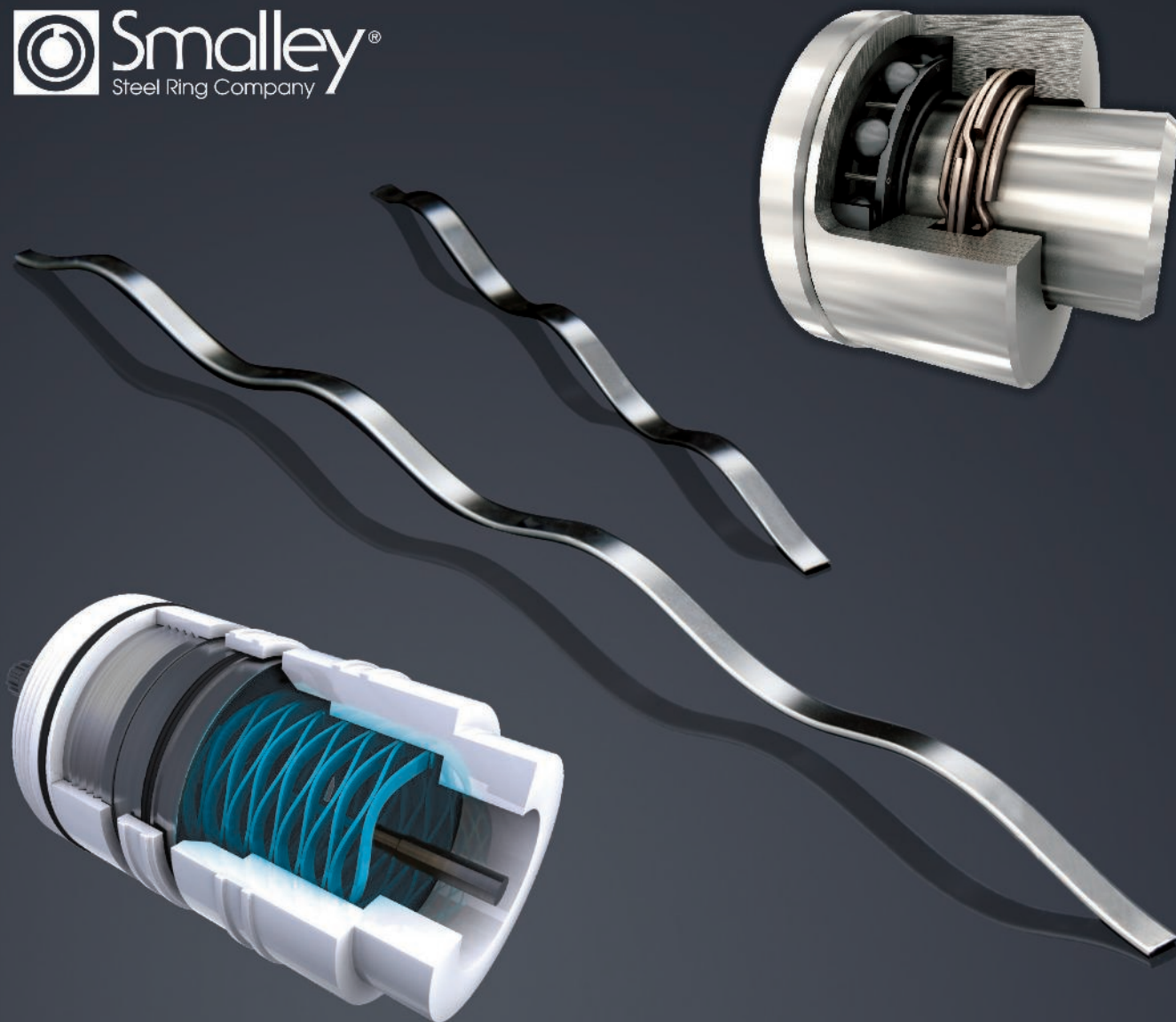


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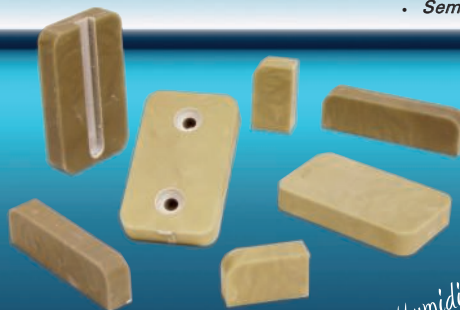
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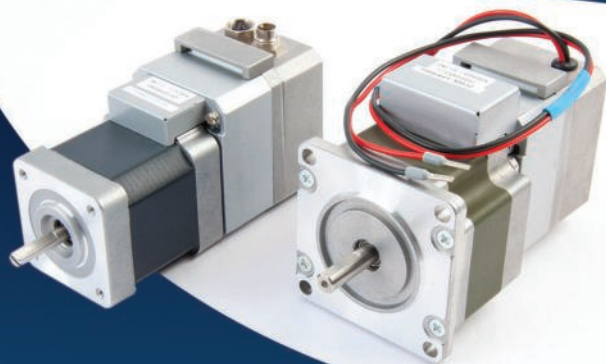


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Meeting a pressing need

Servo technology is helping a press drive manufacturer replace hydraulics with electromechanics. Paul Fanning reports.

TOX Pressotechnik GmbH is well known for its press drives that are used in the joining of sheet metals, commonly used in automobile and white goods production. Market pressure for flexibility, controllability and higher environmental standards led TOX to add to its range press drives with electromechanical operation.

As an alternative to press drives that generate high force with a pneumatic pressure intensifier and a hydraulic cylinder, the servo press drives use less energy, are easy to programme and set up, and do not require high pressure oil and air in the production environment.

Standard TOX press drives are used in thousands of installations worldwide to deliver high axial forces used to give safe and speedy clinching, stamping and embossing.

Forces up to 2000kN are available for joining materials and for other types of machine processes. Compact dimensions allow these press drives to be often installed onto robot arms. The enormous forces are a result of pneumatic pressure being converted into hydraulic force by an integrated pressure intensifier. Assemblies with customised strokes combine the advantages of pneumatics, giving fast strokes, with hydraulics, giving high force.

Although the initial cost is higher, the alternative TOX ElectricDrive servo-driven spindles have customer benefits that have led to an increasing market acceptance. The ElectricDrive modular design is easily adaptable to individual machines with a press force capacity up to 400kN. It consists of a Lenze servo motor with a single-stage planetary reduction gearhead. This is connected by tooth belt to a planetary roller spindle which drives forward the working rod. Control is with



Servo press drives are often used with production robots because of their low weight

resolver feedback to a Lenze 9400 servo inverter mounted in a cabinet.

The servo-driven ElectricDrive is highly dynamic thanks to motors with short-term rating of 300% nominal torque combined with low inertias. This can reduce cycle times, and maintenance downtime is minimal with only an occasional re-lubrication of the roller spindle. Furthermore positional accuracy of the stroke is better than 0.01mm.

A major attraction to plant operators is the ability to rapidly reset the press to suit different materials or processes. The Lenze servo inverter type 9400 is equipped with an integrated PLC which holds the software for the operating cycle. TOX store all the application software in the servo drive including a curve profile monitoring system, 500 process data records and about 270 processes. Resetting for

a new workpiece is done in a moment with communication to the factory master controller by PROFINET bus or Ethernet TCP/IP. For integration of external sensors and actuators, there are analogue and digital I/O terminals on the inverter which can be increased almost infinitely by addition of a Lenze modular I/O system.

It is becoming more common to find factories where hydraulic oil and compressed air are banned leading to servo press drives becoming more and more the preferred choice. The automotive industry has proven to be a trailblazer in this respect, regularly using them in robot-guided joining tongs. In modern automotive factories the use of pneumatic/hydraulic press drives has fallen to about 20%, in part due to the higher weight of such devices. Aside from the automotive area,

TOX ElectricDrives are used in assembly and special purpose machinery for operations such as inserting, riveting, press fits, crimping, piercing, punching and stamping. Typical strokes are up to 250mm with linear speeds around 200mm/s.

Managing director of TOX Pressotechnik, Dr.-Ing Wolfgang Pfeiffer, explains the energy saving advantages of the servo press drives: "Owing to servo technology, these motors are considerably more efficient than pneumatic/hydraulic drives and from a technological point of view, they are the best that is available".

The Lenze servo inverter also has an integrated safety option: "We need Safe Stop for

"Owing to servo technology, these motors are considerably more efficient than pneumatic/hydraulic drives, and from a technological point of view they are the best that is available"

Dr Ing Wolfgang Pfeiffer

robot-guided tongs because there may be people working in the vicinity of the robot. Other applications are fenced off with guards and therefore only need the Safe Torque Off safety function," he says. The Lenze servo inverter offers the highest safety levels demanded by customers meeting Performance Level "e" of EN ISO 3849-1 and "SIL 3" of EN/IEC 62061.

Machine users also profit from the extensive resources that come with the 9400 servo inverter in that TOX not only provides a library of standard functions (operations such as crimping, joining, clinching, etc.) but also an additional library of special functions. This makes it possible to use process jumps or multiple conditions.

The programmability and performance capability of the 9400 servo inverters also opens up further possibilities. With some additional engineering, customised interfaces can be created and the functionality of the servo press drive can be extended almost infinitely. "The integrated PLC and the



possibilities of extending the Lenze solution are the main reasons why we are using it in our high-end presses" explains Dr.-Ing. Wolfgang Pfeiffer. "What convinced us from the very beginning was also the large, harmonised product portfolio and the readiness of Lenze to work together with us as a partner."

TOX Presstechnik was quick to respond to market demands for a range of press drives with electric actuation. In choosing Lenze servo motors and drives, they achieved high dynamics and extensive functionality. Moreover, due to the integrated PLC, the servo press drive can cover a wide range of applications and can easily be adapted to a large variety of different tasks.

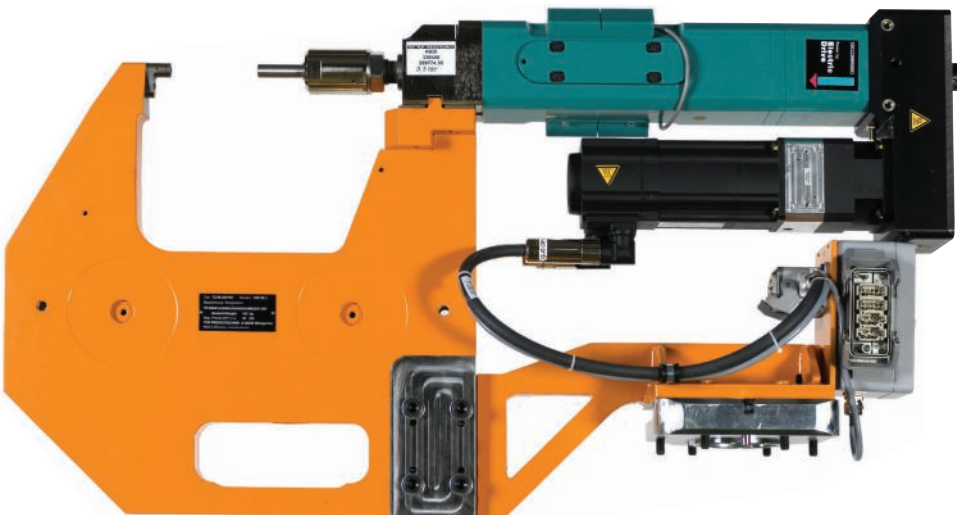
As the electromechanical servo press drives do not need hydraulic oil or compressed air and work with permanently excited synchronous motors, they are especially energy-efficient, environment friendly and are practically maintenance-free. The operating costs are also correspondingly lower, with the result that the higher acquisition costs compared to conventional pneumatic/hydraulic press drives are amortised completely within just a few years.

"Low operating costs and a high degree of environmental compatibility in particular are becoming more and more important for users. They are increasingly basing their decision to buy not on the purchase cost but on a calculation of the total lifetime costs", concludes Dr Pfeiffer.

www.lenze.co.uk



Below: The TOX Pressotechnik ElectricDrive with Lenze synchronous servo motor



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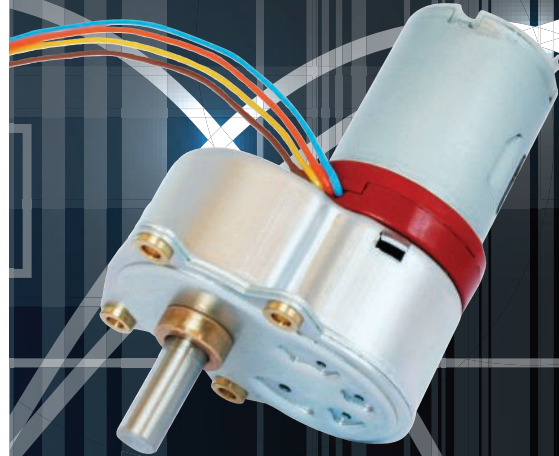
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VSD helps achieve major savings

Choosing VSD compressor technology from Atlas Copco has helped International Flavours & Fragrances (IFF), a leading global creator of flavours and fragrances for consumer products, achieve major energy savings at its UK manufacturing plant in Haverhill, Suffolk.

IFF is a long-standing customer of Atlas Copco Compressors who, prior to an expansion programme, had originally installed an oil-free, fixed speed ZT3A together with a

ZT290 machine on a service contract at the site. The compressors provide 100% oil-free air for process instrumentation, the operation of pneumatic valves for powder transfer and plant-to-plant product conveying.

Performance logging of the compressors, carried out prior to the expansion highlighted the fact that significant energy savings could be achieved with the installation of a single variable speed drive compressor to replace



both existing units. The ZT160VSD was selected for its ability to match compressed output to demand in variable full load/variable load production cycles and its wide turndown range. This single compressor alone can provide all the air for the site while the old ZT3A has been retained as a standby unit.

www.atlascopco.com

Motor/drive package available for OEM applications

Applied Motion Products Inc has launched a new low-cost version of its STM series NEMA 17 and 23 frame stepper motors with integrally mounted microstepping drive and control. The new STM-R strips down the choice of control options available through the range to

offer only step and direction or cw/ccw pulse control modes. Offering best value for OEM applications, the units are designed for use with an external controller that would typically provide one of these types of step/pulse signals.

STM-R integrated steppers

include three digital inputs that accept pulse/direction and enable/disable motor power signals at 5-24 VDC. A single digital output is included for drive and motor fault. The drive uses the same sophisticated current control, anti-resonance, torque ripple smoothing and

microstep emulation that is found throughout the STM series. Users requiring stall detection or position verification can choose an optional 4000 count/rev encoder option to use in conjunction with their own controller to monitor encoder position whilst commanding motor position.

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Machinery uptime critical to recycling industry future

Ian Allan of ABB-Dodge looks at how mechanical power transmission technology is dramatically affecting the uptime of the recycling sector.



The UK recycling industry is big business. More than 290 million tonnes of waste is generated each year, all of which causes environmental damage and costs businesses and consumers money. The good news is that UK recycling saves more than 18 million tonnes of carbon dioxide a year – the equivalent to taking five million cars off the road. But following publication of the Government's Review of Waste Policy, in which it sets out its policies and actions designed to help move towards a zero waste economy in England, the pressure on recyclers everywhere has never been greater.

Maintaining plant uptime

One pressure is the need to maintain plant uptime. Whether you recycle tyres, video tapes, paper, computer boards, toner cartridges, or glass, there is a diversity of machinery being used from bailers, classifiers, driers, compressors, crushers, shredders and shears. And one thing that links them all is that the machine's mechanical parts, like reducers, couplings, bearings and gearboxes will be suffering because of arduous operating conditions.

At ABB-Dodge, we are finding machines lasting less than six months. Some suffer excessive water and material damage which leads to high corrosion resulting in the use of heat to remove the bearing or, in many cases, scrapping of the shaft altogether. Changeover of components, therefore, can be time-consuming. The aggressive nature of tyre shredding, for example, means that repairing the machines is taking up far too much of time.

Recyclers should pay special attention to each of the components that make up the machine's transmission system as quite

often the technology of the original design may have moved on.

Tyre shredding

Sapphire Energy Recovery is one company that was suffering excessive downtime. Its investigation into bearing alternatives revealed a method from ABB-Dodge called Grip Tight. Grip Tight is an innovative adapter-mounted ball bearing system which features a built-in mechanism for removing the bearing from the shaft and a DualGuard sealing system that keeps contaminants out. This technique has completely resolved a recurring - and expensive - repair problem that Sapphire was facing.

The company operates high-throughput shredding machines that provide a sustainable solution for end-of-life car and van tyres by processing them into chips. These chips are then used as an alternative to coal in cement manufacture.

After shredding, the tyre chips are graded for size by a classifier with 36 sets of bearings. The classifier shafts' set-screw style bearings were being damaged, by both the fine metal wires in the tyres, and the water used for cooling. As a result they had a life, typically, of less than six months.

Changing the classifier bearings could then take anything up to two hours per bearing, depending on the problems encountered and the skill of the operators. Corrosion sometimes meant that the bearings needed to be loosened by heat, for example, and in some cases the whole shaft had to be replaced.

The adapter-style bearing has a mechanical maintenance feature that loosens it by simply turning a nut. The action automatically pulls the bearing off the adaptor, avoiding any need for forcible removal or expansion heating - eliminating

fretting corrosion and preventing shaft damage.

Sapphire purchased some Grip Tight bearings and installed them as and when the previous bearings failed. Although predictable maintenance was the company's major requirement, it soon became obvious that the bearings offered a superior life too. The Grip Tight's DualGuard seal with its rubberised flinger is protecting the bearings in the hostile environment to such an extent that they are lasting typically twice as long as the previous set screw types.

Packaged solutions

While examining individual components is essential, it also pays to consider the entire drive train from couplings, gearboxes, motors and drives. Today ABB-Dodge is offering a packaged solution for OEMs as well as for retrofitting to existing machines. The approach provides a single source for the design, selection and procurement of multiple component systems while also simplifying the supply chain, leading to one invoice.

Based on the customer's specifications, the criteria are reviewed and the correct products for the application are selected and priced. The solutions incorporate high quality, long lasting ABB-Dodge products including reducers, conveyor pulleys, bearings, take-up frames and motors. The combination of these products offers users lower maintenance costs and more versatility. By providing ease of selection, procurement and delivery, ABB-Dodge is able to lower the total cost of ownership, while providing the power matched product solutions.

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Simulator interrogates car design

A full-motion simulator is being used by JLR as a virtual engineering tool that tests the success or otherwise of designs. Paul Fanning reports.

Cruden, the world-leading motion simulator company, has supplied Jaguar Land Rover with a 6-DOF (full-motion) simulator to be used as a virtual engineering tool by multiple design teams at the company's design and engineering facility/centre in Gaydon, UK. The Jaguar Land Rover simulator is extremely versatile, being suitable for both Jaguar and Land Rover vehicles and featuring integrated production vehicle hard- and software.

"Our simulator can be used across many different vehicles bringing real benefits of scope," says Frank Kalff, commercial director at Cruden. "Jaguar Land Rover will be using it for vehicle dynamics, NVH and ride assessment as well as HMI, control systems, aerodynamics, off-road capability and Advanced Product Creation programmes. It's a platform which allows excellent cross-functional working within metres of where most of the key engineers are based.

"We've been working alongside the Jaguar Land Rover team for some time and have seen that they were able to dive straight in and use the simulator to interrogate the stability and precision of latest generation cars. They set out with small, defined tasks and were surprised how soon, even in its 'off the shelf' state, the simulator started to throw up other, unanticipated characteristics and action items to be investigated. A simulator can help automotive engineers assess the driving experience qualitatively, in terms of 'feel,' just as their customers do. This is far more useful than desktop simulations in isolation."

Jaguar Land Rover has been working with Cruden for over a year using a temporary,



adapted Hexatech simulator while developing its bespoke simulator, which has recently been installed.

Cruden is the world's leading designer and manufacturer of professional, interactive, motion-based racing simulators. The company develops the most high tech, realistic and accurate professional equipment for the top levels of international motorsport, including Formula One, as well as vehicle manufacturers

and their suppliers. The same package is then made available to the global attractions market and to private individuals to create a motorsport experience that simply does not compare with 'games' machines on the market. Cruden's heritage is in the development of professional simulators for the aerospace, marine and automotive industries.

Specification details include an actual production seat, various Jaguar and Land Rover steering wheels (with reach and rake adjustment) and pedal boxes which are integrated into the driver cockpit area to provide the most realistic driving position, and are interchangeable within around 20 minutes.

The simulator integrates with the IPG Carmaker vehicle modelling software used by Jaguar Land Rover for its desktop simulation via Cruden's ePhyse Net external physics interfacing package. The software allows companies to run their vehicle models natively, in co-simulation, with its simulators, saving time on compiling code and saving cost by eliminating the need to purchase the Real Time Workshop conversion package.

The simulator runs on Cruden's own Racer Pro operating software. Cruden also produces the LIDAR scanned professional tracks and roads used by Jaguar Land Rover for their virtual testing programme. It can be operated and adjusted by the driver using Cruden's recently-launched Race Manager app via a dashboard-mounted tablet, eliminating the need for a support engineer to be on hand whenever the simulator is in use.

www.cruden.com

New digital pressure sensors

Honeywell Sensing and Control's new Digital Pressure Sensors with CANopen®, Model DPS, are rugged, all-welded, provide consistent performance in harsh environments, and can be used in a wide range of demanding applications like transportation, process control, factory automation, medical equipment systems, and aerospace test and research.

Model DPS sensors



are highly configurable, so customers can choose from multiple pressure types, accuracy levels, pressure ranges, pressure connections, and electrical terminations to meet specific application needs. Configurations for digital measurements are

fully temperature compensated and calibrated for pressure ranges from 10 psi to 10K psi or 1 bar to 700 bar or

70kPa to 70000 kPa, with accuracy ranges of 0.25% and 0.1%, and operating and storage temperature ranges from -25 °C to 85 °C [-13 °F to 185 °F]. Built tough to withstand harsh environments, the Model DPS with CANopen® protocol communication allows customers to connect to longer cable distances without sacrificing accuracy.

<https://measurementsensors.honeywell.com>



NEW MINIATURE COLOUR SENSOR

A new miniature colour sensor has joined the F 25 miniature sensor family from SensoPart Industriesensorik: the new RGB colour sensor FT 25-C is currently the smallest and fastest cubic colour sensor on the market.

Typical applications of the FT 25-C miniature colour sensor include recognition of printing marks on packaging material and detection of labels or adhesive spots in packaging and labelling machines as well as lid detection in filling plants.

Measuring just 34 x 20 x 12 mm3 with a switching frequency of up to 10 kHz, the RGB colour sensor FT 25-C is designed for fast automation processes, such as detection of printing marks on packaging materials. The sensor reliably detects even the subtlest nuances in colour as well as 'non-colour' such as black, white and grey.

www.sensopart.com

Torque sensor has upgraded communication

The Kistler KiTorq (<http://tinyurl.com/kistler-4434>) torque sensor system is now available with Profibus, Profinet CANopen, Ethercat and EthernetIP interfaces in addition to the analog/frequency, USB and RS-232 interfaces. The new stator is fully compatible with all KiTorq type 4550A rotors. The new communication options allow the KiTorq system to be integrated directly into the user's test environment through the fieldbus interfaces.

This saves time during installation and eliminates the cost of additional equipment to convert

measured data making the new KiTorq stator exceptionally cost effective for test stand design, installation and operation in applications for electric motor, internal combustion engine, transmissions, pump and compressor testing.

The new stator can be used with any KiTorq rotor of the same speed rating and will automatically recognise the rotor measuring range. With rotors available with seven measuring ranges from 100 to 5,000Nm, hardware investment is minimised as one stator may be used with rotors of differing



ranges for different applications.
www.kistler.com

Measurement in harsh environments

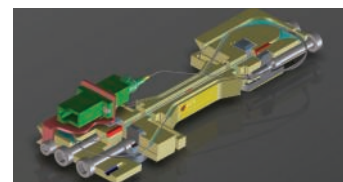
Measurement of strain or temperature in harsh environments often requires specialist equipment, preparations or processes. Traditional electric technologies can sometimes only be used once sophisticated and expensive barriers, shielding methods or other protection is in place.

FBGS, however, uses draw

tower technology to manufacture its fibre optic grating sensors. This results in a product that is not only mechanically stronger than traditional Fibre Bragg Gratings (>5% strain) making manual handling easier, but due to the unique composition of the glass it can be mounted on intricate structures requiring twists and turns not normally

associated with optical fiber based measurement systems.

Furthermore, multiplexing many sensors on a single fibre is possible, thus reducing both the complexity and weight of the installation. Perhaps most importantly and unlike electric strain gauged sensors, optical fibrebased sensors do not require a recalibration once



installed. It is possible to return to them after weeks, months or years and simply plug in an instrument to read the relative change of strain since the last visit.

www.fbgs.com

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Personalised swords helped Japan gain fencing silver at last year's Olympics – and 3D printing played a major part. Here, Paul Fanning finds out how.

3D printing gives the cutting edge

A Japanese University is using 3D printing as part of its advanced research and development programme for sports science and Olympic training.

The University of Tsukuba conducts research and development in three key areas: sports equipment, training and conditioning. A research team led by Professor Norihisa Fujii at the university's Faculty of Gymnastics developed equipment used by Japan's fencing team which won the Silver medal in the 2012 London Olympics.

The hilt of the fencing sword must fit the fencer's hand perfectly. Even a slight difference in the shape of the hilt can spell victory or defeat. Before 3D printing, there was only one type of fencing hilt in the world, and each competitor had to file the hilt personally to customise the fit and achieve a non-slip surface. If the sword ended up breaking, it was almost impossible to get another one with the same fit.

For the 2012 Olympics, the researchers at the University of Tsukuba scanned the actual equipment used by the fencers in 3D, and the resulting polygon data was then incorporated

into 3D CAD. The 16-micron accuracy of the PolyJet based Objet350 Connex 3D Printer enabled the researchers to produce iterative prototypes of each sword with minute variations according to the athlete's feedback. In total, 70 prototypes were produced.

Mr. Osamu Takeda, a researcher who managed the modeling of the prototypes at the University of Tsukuba, Sports R&D Core commented: "Players are not engineers. They talk about their requirements instinctively. So, bearing this in mind, we develop various patterns based on different assumptions. With the Objet Connex multi-material 3D Printer, we can do this easily. We can respond flexibly and promptly because the machine is so accurate."

The customised, completed hilts were manufactured in April 2012, three months before

"Whatever the sport may be, it's all about designing customised equipment to enable the athlete to maximise his or her personal best."
Jon Cobb, Stratasys



Mr. Osamu Takeda

the London Olympics. For the first time in fencing history, each competitor had five spare hilts, providing a "sense of security."

"Whatever the sport may be, it's all about designing customised equipment to enable the athlete to maximise his or her personal best," said Jon Cobb, executive vice president marketing, Stratasys. "Stratasys 3D printers have a long history with the sports world, spanning everything from the design of customised running shoes to the 3D printing of end use parts for bikes and snowmobiles.

The accuracy of our technology and the durability and flexibility of our materials enable sports equipment designers to develop truly breakthrough concepts. Also, the fast turnaround time of 3D printing means that the athlete can try several design iterations until the equipment exactly matches personal preferences."

The University of Tsukuba is now exploring other 3D printing sports applications such as protective equipment for gymnasts, shoes for javelin throwers, triathlon wear, sailing masts and a footwork assessment system for badminton.

www.stratasys.com

Additive manufacturing races ahead

A 3D printing expert has adapted his skills to his new cycling-related business. Paul Fanning finds out more.

Having been employed by additive manufacturing specialist 3T RPD since 2000, Martyn Harris had a certain advantage when he started his new business, RaceWare Direct, to manufacture bespoke plastic brackets for mounting instruments onto racing bikes and to produce titanium components like chain catchers and handlebar stems.

The new venture came into being in early 2012, after he tried to buy a mount to secure a computerised power meter safely and neatly to his aero extension TT bars (forward facing extensions to a bike's handlebars that improve aerodynamics in time trials).

He said, "All I could find was a horrible adaptor kit, which included cable ties to lash up the instrument to the bars, so I thought I would make my own mount using the EOS additive manufacturing machines at work.

He quickly discovered via the internet that a lot of other people were looking for ways to mount power meters, global positioning systems

(GPS), cameras and other instruments to their bikes, without using the manufacturers' clunky bracketry. One of Harris' contacts was cycling enthusiast Jason Swann, who sent through a CAD file of his ideal mount for a Garmin Edge GPS.

It took just four months to progress from the first iteration to the wide range of products that RaceWare now sells online for mounting Garmin equipment onto road drop bars and aero extensions. They cater for every possible bar size and stem width combination to allow perfect central positioning of the GPS device. The mounts can be painted after vibro-finishing if the customer prefers a neon colour to the white of the EOS PA2200 nylon material from which the products are 3D printed.

The variety of Garmin mounts manufactured means that batch

sizes are small, from 10-off to the low thousands. It would not be cost-effective to produce them by injection moulding, as the tooling would be prohibitively expensive. Building 3D parts directly, layer-by-layer, not only involves much lower initial outlay but also speeds progress from the drawing stage, through honing the design in CAD and 3D printing prototypes, to production of the finished articles.

Martyn continued, "People find it difficult to understand how we produce new parts so rapidly. They ask about lead-time and I reply 'two to three weeks', whereas they are used to hearing six months to a year.

"It allows us to respond very quickly. For example, I produced in a matter of days two bespoke Garmin 500 mounts with lettering down the side saying 'Reading GP 2013', one each for the winner of the men's and ladies' races at a meeting in July."

RaceWare also markets lightweight metal bike parts, which are manufactured additively in EOS machines designed for producing a nest of components, layer-by-layer, from metal powder rather than plastic. In addition to the hollow titanium chain catcher, which is now a commercial product, and the very stiff handlebar stem, which is still at prototype stage, Martyn has just started offering a titanium race number holder and will be looking to introduce more metal parts next year. The powder material used for these applications is EOS Titanium Ti64.

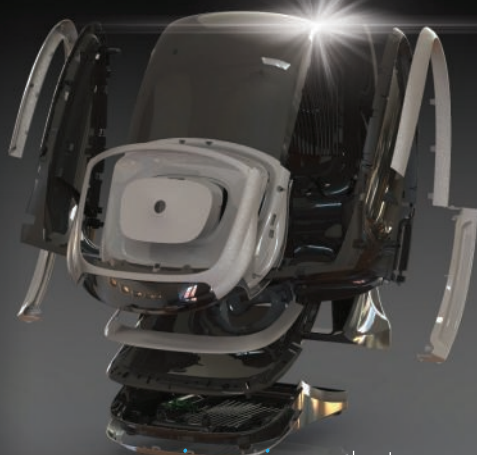
www.3trpd.com

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Raceware sells a variety of 3D-printed products for mounting a variety of Garmin devices





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Paul Sanford, Schneider Prototyping UK General manager, is delighted to be reunited with Helen after having worked together previously and stated 'it has taken a couple of years to secure Helens appointment, I knew from the outset that Helen was the person we needed to represent us in the UK, her appointment represents a significant step forward for the company and for our existing, as well as future clients, she is a true professional and we are all looking forward to having Helen on the team'

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Intellectual Property Litigation: When Is A Threat To Sue Unjustified?

What should you do if you're threatened with litigation on the grounds of IP infringement?

Claudia Rabbitts, an associate with D Young & Co LLP offers some tips.

Although steps have been made to reduce the cost of intellectual property ("IP") litigation, it can be a daunting prospect, particularly for a retailer or small business. IP rights holders may feel the need to sue for infringement and to use their financial resources to fight any litigation should it go to court, whereas the prospect of litigation to a smaller business could mean a crippling financial burden, and use of precious management time. Given the cost of litigation and potential damage to their business, it is understandable why businesses sometimes choose to settle the claim out of court. However, when being threatened with infringement proceedings, the recipient should consider whether this threat is an 'unjustified threat'.

During the ongoing development of IP legislation, attempts have been made to address the problems outlined above and to give retailers possible redress when faced with an unjustified threat (meaning the recipient of the threat can sue the IP rights holder who made the threat, and may be awarded a declaration of non-infringement, an injunction or damages). The legislation varies for different types of IP rights and I will focus on patents and registered designs. Put simply, a threat is made if what is communicated is understood by the recipient as being a threat to sue for infringement; the threat will be unjustified where no infringement has taken place. It is noteworthy that the threat does not need to be specific, and an implied 'veiled threat' will still constitute a threat. Generally, however, a mere notification that an IP right exists will not amount to a threat. In the case of threats to sue for patent infringement, providing factual information about the patent, making enquiries to find out if there is infringement and



"assertions" about the patent for the purpose of making the enquiries, will not amount to a threat.

Threats legislation is an attempt to strike a balance between allowing an IP rights holder to enforce their rights, and third parties to carry on their business without having to deal with unjustified threats. It is considered that those who will be most aggrieved by a threat are likely to be retailers who are selling the product, rather than a manufacturer or importer, who are more likely to have greater knowledge of the product in general. With regard to patents, threats relating to making or importing a product, or using a process¹; and in relation to designs, making or importing – these threats are allowed.

Practically speaking, if you or your business receives a letter containing a threat to sue for infringement, the threats will be allowed if it is proved that the IP right has been infringed. The IP right must be valid, except in the case of patents, where a defence will be if infringement

of the patent is proved, even where the patent is found to be invalid, provided it can be shown that the rights holder did not suspect the relevant part was invalid at the time of making the threat.

Some reforms have already taken place regarding threats in patent actions, but the Law Commission is currently undertaking a wholesale review of the provisions and has been consulting on potential changes to the law. While it is appreciated that a balance is still necessary, the reforms

will probably see changes to the law to make it easier for businesses to enforce their IP rights without the same fear of court proceedings for threats actions. The Law Commission has acknowledged the concerns of small businesses but feels that the current provisions allowing for unjustified threat actions hamper genuine pre-litigation negotiations over legitimate disputes. The provisions are also in contradiction of the rules that govern litigation procedure in England and Wales as their aim is to encourage negotiations in the first instance, followed by litigation only if necessary.

If you receive a threat for infringing an IP right look carefully at what it is you have been accused of and importantly gather your own evidence as to what you (and your staff) have actually been doing. Preliminary legal advice need not be expensive and so if you feel the threat is genuine, seek prompt legal advice.

¹ *In relation to patents alone, by virtue of amendments to the Patents Act 2004, a threat may now be made against a retailer or retailer without being classed as "unjustified" if the patent proprietor has used their "best endeavors" to discover the identity of the alleged "primary" infringer (i.e. manufacturer or importer) but has failed to do so.*

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Once upon a time, taking delivery of a postal package was a relatively rare and special event for most people. It usually meant that something long-anticipated like a gift or a special purchase had arrived and was hotly anticipated.

The advent of internet shopping, however, has made the arrival of a package much more commonplace. We all buy so much by this method that a package arriving is no longer unusual. Indeed, according to the Interactive Media in Retail Group, over £46bn was spent online last year.

This massive increase in online retail, however, places an additional imperative on the retailers to ensure that the packages arrive in good condition. After all, what could be more disappointing than to receive a package, only to open it and discover its contents are broken? And how many of us actually check the package to ensure it isn't broken in the presence of the courier?

Of course, when we do receive such a broken item, we tend to be able to get refunds or replacements fairly easily, of course, but this still leaves the retailer and courier company with the problem of how deciding where exactly in the delivery process the problem occurred and hence where to apportion blame and cost.



The Challenge

What is needed, then, is some means of monitoring a package at every stage to check what has happened to it.

Short of fitting every package with a remotely-accessible camera that allows the owner to view exactly what is happening to it at any given moment, this challenge presents some issues. Another possibility would be to fit the package with an alarm similar to that on a car that is triggered by impact.

The problem with these solutions, of course, is first that they would be prohibitively expensive, bulky and – in the case of the alarm – noisy, too easily triggered and irritating (at least if car alarms are anything to go by).

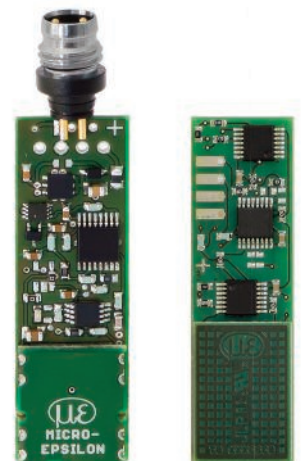
The solution we have in mind is relatively simple, but highly effective and offers a sender-to-recipient tracking service that leaves no doubt as to what has happened to the package and – more importantly – where.

However, there is no reason to assume that the readers of *Eureka* cannot come up with something better. We look forward to finding out.

The answer to last month's Coffee Time Challenge of how to make it safer to cycle on the roads at night can be found in our Technology Briefs section on page 12.

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Metering Pumps

Mechanical Speed Adjustment for Hydra-Cell Metering Pumps

Wanner International has introduced a range of mechanical speed variators for manually adjusting the rotational speeds and output flows of its Hydra-Cell metering pumps. These pumps are used in oil and gas production for injecting chemicals such as acids and bases, amine gas sweeteners, oxygen scavengers, polymers and proprietary chemicals into process streams. The Wanner mechanical speed variator is ideal for use in explosive environments and is ATEX certified for zones 1 and 21.



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Routers & Fault Monitors

New GPRS Router and Fault Monitor now with Modbus and RS485

INSYS icon release IMO-2

The IMO range of GPRS routers from INSYS icon have been added to with the IMO-2 fault monitor.

Monitored events can be digital I/O, Modbus registers and individual bits (TCP, RTU and CS), timers and received SMS. Actions include notification via email and SMS, switching digital O/P, writing Modbus registers.

The router functions comprise dial in dial out and call back, connection management compatible using open VPN. DHCP server is also included as is serial RS232 and RS485 to Ethernet gateway.



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Sensors

SICK OD Mini

With the new OD Mini short range distance sensor achieves micron resolution and millisecond responsiveness in a rugged, compact and lightweight unit making it ideal for precision measurement and positioning applications



where high levels of accuracy are demanded, especially at high speeds, for example for positioning of robotic gripper arms, or in precision machining. The SICK OD Mini's high performance measurement capability also means it can be used for quality duties such as inspection of manufacturing tolerances.

www.sick.co.uk

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Sensors

New cost effective and flexible ETP temperature sensor range covers all bases for mounting and measurement

Variohm EuroSensor has released its new ETP range of temperature probes based on a MEAS thermistor. To suit the broadest range of industrial, automotive and scientific applications for precision temperature measurement, four basic packaged design types are available that each offers a choice of options. The four designs conveniently mount the industry standard thermistor in a choice of Ø 4 mm PTFE or Ø 5 mm brass housings, ring terminal probes, or hexagonal head bolts. Within each packaged design, a standard off-the-shelf stock version is available with a 10K3 sensor fitted and the comprehensive list of optional features offered for each type include; housing diameter and length for the cylindrical probes, ring terminal mount diameter/size, and metric thread size for the hexagonal bolt version. The leadwire length for all types is similarly specifiable.



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