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> Magna SteyrDesign

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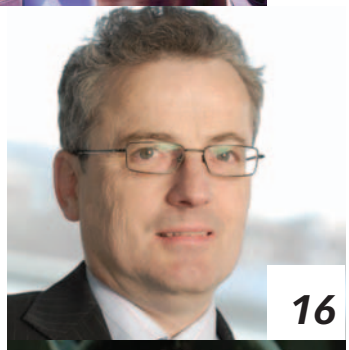
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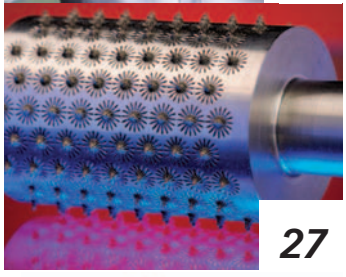
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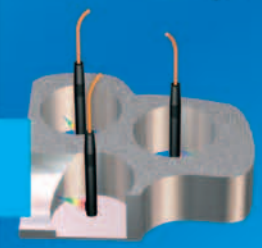

NEW

optoNCDT 2402
The world's first miniature sensor with just a 4mm outside diameter

Laser profile sensors

- Measuring ranges from 25 to 245mm
- Lightweight and compact sensors
- Very high measuring rate of 256kHz
- 3D view of the target
- Micrometre resolution

Typical applications:

Position and contour measurement, edge detection, web width, groove width / depth, welding seam inspection, welding robot control

NEW

scanCONTROL 2700
Most compact design with integral controller

Laser triangulation sensors

- Measuring ranges from 2 to 1000mm
- Models with integrated controller
- From low-cost entry level models up to highest precision in class
- Analogue and digital interface
- In built synchronisation for thickness measurement

Typical applications:

High precision measurements in automation, positioningand in-process quality control

NEW

optoNCDT 1302 / 1402
Very compact sensors with integrated controller

optoNCDT 2220
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optoNCDT 2200LL
Small laser line for metallic, shiny surfaces

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NEW

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Micro-Epsilon UK Ltd. • info@micro-epsilon.co.uk

Editor
Paul Fanning
pfanning@findlay.co.uk

Group Technical Editor
Dr Tom Shelley (PhD, CEng)

Group Editor
Graham Pitcher
gpitcher@findlay.co.uk

Art Editor
Martin Cherry

Technical Illustrator
Phil Holmes

Advertising sales
01322 221144

Sales Manager
Luke Webster
lwebster@findlay.co.uk

Account Managers
Tricia Bodsworth
tbodsworth@findlay.co.uk

Classified Sales Executive
James Slade
jslade@findlay.co.uk

Production Manager
Heather Upton
hupton@findlay.co.uk

Circulation Manager
Chris Jones
cjones@findlay.co.uk

Publisher
Ed Tranter
etranter@findlay.co.uk

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A balanced budget?

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

"You can't please all of the people all of the time" is a well-worn political maxim and one that becomes particularly apt when budgets are being unveiled.

By definition, an 'emergency budget' is unlikely to contain cheery news and, since it was announced, George Osborne's budget has attracted criticism, not least from those it most negatively affects. Such criticism was inevitable, of course. Everyone may agree that savings are necessary, but the unspoken caveat is usually 'as long as they don't affect me'.

One thing it was reasonable to hope for, however, was a budget designed to support and encourage industry. So is that what we've got?

Things did not appear to start well with the cancellation of the Sheffield Forgemasters loan guaranteed by the outgoing government. Perhaps more significant, though, could be the huge cuts in spending that are likely to hamper the activity of the Department of Business Innovation and Skills. How this will affect industry in the long term remains to be seen.

But it is far from all being bad news. The Government does appear to have taken on board the recommendations of a number of industry bodies, with innovation and start-ups being encouraged by the the maintenance of R&D tax credits, the 10% capital gains tax rate for entrepreneurs and a scheme to make it easier for small businesses to borrow money without assets to act as security. Equally, a cut in corporation tax, proposals for a green investment bank, a reform of the climate change levy have all largely been welcomed.

So is it a good budget for industry? There are arguments both ways, but it seems prudent to reserve judgement – at least for the moment.

Marcos Gabriel Niveiros, Sales Supervisor of the Integrated Solutions Centre:

“One thing you can rely on: When you are out there, WEG is too.”

Protecting Your Environment

Ensuring that new and replacement electric motors adhere to the requirements of aggressive and explosive atmospheres is why you can rely on WEG. WEG’s recently launched W22X range of flameproof motors covers ratings from 160kW to 1400kW for IIB and IIC gas groups, as well as mining group M2, adding to the existing range of hazardous area motors from 0.75kW to 40MW. The W22X adds to WEG’s comprehensive range of motors, generators, transformers, and motor control centres.

Transforming energy into solutions. **www.weg.net**

Skills investment sees record rise

Demand for engineering vocational qualifications rose by record numbers in the first quarter of 2010, according to figures from Semta.

Semta, the Sector Skills Council for science, engineering and manufacturing technologies, has released new figures on the health of engineering vocational qualifications in the first quarter of 2010 (1st January to 31st March).

The total number of certifications awarded during the first quarter of 2010 was the highest Q1 figure to date, with an increase of 15% against the same time last year. Although Level 1 certifications fell by 13%, Level 2 increased by 16%, with a 21% increase for business-improvement techniques (B-IT). Level 3 certifications were also up 17% on Q1 2009, with increases for high level skills in aeronautical engineering, B-IT, installation and commissioning and engineering technical support.

The total number of registrations for National/Scottish Vocational Qualifications (N/SVQs) for Q1 of 2010 fell by 21% compared to quarter one of 2009; although registrations for 2009 proved exceptionally high, and the current 2010 figure remains higher than any other previous figures for quarter one. While Level 2 registrations also dropped by 27% from Q1 of 2009 they are also at their highest level for any other Q1. Level 3 registrations have remained steady.

According to Semta, the record rises in vocational qualification take up in Q1 2009 demonstrates the continued commitment of engineering employers to invest in their workforces, despite the challenging economic climate.

Philip Whiteman, chief executive of Semta (pictured), said: "We must ensure that every employee can be developed to their full potential as we need a highly skilled and adaptable workforce, particularly to support advanced manufacturing, life sciences, green and emerging technologies. These opportunities are out there for companies who have weathered the downturn, but they need world-class skills to remain competitive.

"Vocational qualifications, such as B-IT, are capable of making the biggest impacts on the bottom line. Businesses working with Semta's National Skills Academy for Manufacturing have seen, on average a 6:1 ratio of return on their investment in skills, helping many of them survive the downturn."

www.semta.org.uk

Rockwell to sponsor Mechatronics award

Leading global provider of industrial automation power, control and information solutions Rockwell Automation has agreed to sponsor the Mechatronic Design category of this year's British Engineering Excellence Awards (BEEAs).

Rockwell Automation to sponsor Mechatronic Design awardNow in their second year, the BEEAs are designed to demonstrate, promote and celebrate the quality of engineering design within the UK.

The Mechatronic Design category is new this year and Andrew Smith, Rockwell's commercial engineering team leader said of the company's sponsorship: "At Rockwell Automation we continually strive to develop automation solutions that provide our customers real value. Be it in the areas of plant-wide optimisation, machine builder performance or sustainable production, our focus on innovative products and services is a constant driver. It is these principles of creativity, innovation, and delivering customer value that lead us to proudly sponsor the Mechatronic Design Award at the 2010 BEEAs – an award that clearly recognises the application of engineering talent with leading edge technology. "

Entries for the British Engineering Excellence Awards close on 31 July 2010 and the shortlist will be announced on 25 August. The final judging session will take place on 1 September and the Awards will be presented at a lunch event, being held at the Globe Theatre in London on 14 October.

For more information or to enter, go to **www.beeas.co.uk**

beea
british engineering excellence awards

Briefs

NEW CHAIRMAN FOR RENEWABLEUK

RenewableUK has elected Andrew Jamieson, ScottishPower renewables regulation and markets director, as the new chairman of the UK's leading renewable energy trade association.

Maria McCaffery, RenewableUK's Chief Executive, said: "Andrew Jamieson is a hugely respected industry executive and a true champion of renewable energy. As Chairman of RenewableUK, Andrew will be an important advocate for the association, as well as someone who can bring to the table a wealth of practical experience on all the key issues concerning deployment."

SIEMENS WINS INNOVATION AWARD

Superconducting magnets for use within magnetic resonance imaging and designed by Siemens Magnet Technology have won the Autodesk Award for Product Innovation at this year's Manufacturing Excellence Awards. The awards, run by the Institution of Mechanical Engineers, celebrates UK manufacturing success. More than 30% of all MRI scanners in hospitals and clinics worldwide contain a magnet designed and manufactured at the company in Oxfordshire.

PLASTICS AWARD DEADLINE LOOMS

Entries for the 2010 competition for the British Plastics Federation Horners` Award for Plastics Design and Innovation must be received at the British Plastics Federation's offices by the deadline of 30th July 2010.

This is an annual opportunity for manufacturing companies and designers to join the ranks of winners which have recently included Omlet.

Application forms are downloadable from http://www.hornersaward.co.uk

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Robot can touch its toes

Mitsubishi Electric has added a new model to its robot line-up, designed to work in confined spaces and perform intricate arm movements.

The RV-2SDB robot uses innovations in design and construction that allow the arm to reach items right next to its base. This means the space required for the working cell can be minimised, an important consideration in many manufacturing and assemble environments. It also allows the robot to perform a greater range of movements and task than earlier designs. Both advantages are likely to lead to significant costs savings for users.

Key to the RV-2SDB's agility is an arm design that even allows access to the area immediately surrounding the base, making the maximum use of the surrounding space.

www.mitsubishielectric.co.uk

Continuous motion moves forward

HepcoMotion's new Precision Ring Track PRT2 system comprises a comprehensive range of ring slides, ring segments, bearings and ancillary components to suit most rotary and track system applications. It introduces a substantially expanded range of sizes, with the added benefit of across the range load capacities being increased by a typical 50% or more.

This friction-free, debris-tolerant system also adds several new options that allow innovative and highly reliable technical solutions to be engineered. The extended choice of ring slide types – double-edged, single edged, internal/external Vees, gear cut or plain – is available in various diameters in both steel and stainless steel with hardened Vee edges for maximum wear resistance. They provide circular motion control at the periphery where it is needed and a large hollow centre to accommodate other components, services and even people in the case of an MRI scanner.

www.hepcomotion.com

Metool extends carrier series

The Uniflex Advanced series of lightweight, quiet and cost-effective plastic cable carriers from Kabelschlepp – has been expanded to include a new version which is especially robust. The 1320 series was developed as a heavy-duty version with a one-piece chain link to enable safe guidance of stiff hydraulic hoses in the extendable outriggers of a concrete truck; installation of the cables in the cable carrier is fast and easy. The limited space required a compact cable carrier system. This was achieved by very small bend radii and by a favourable ratio of inside to outside width: despite the compact outer dimensions, the interior has enough space for the hydraulic hoses. The harsh operating conditions – the dirt, the shocks and jolts and the mechanical loads – cannot harm the torsionally rigid cable carrier. A double stroke system for long unsupported lengths and lateral wear surfaces provides for durability.

www.metool.com

DRIVES AND CONTROLS GET THE MOST POWER FROM THE LEAST AREA

Schneider Electric's Lexium 32 range of three servo drives and two servo motor types is a simplified family that comes in a compact book style, offering maximum efficiency in a reduced space.

The products have been developed to meet OEM architectures, with advanced tuning features and motors with a wide machine inertia. Applications span a range of machinery, including printing, textiles, packaging and material working and handling.

A key feature of the range is its compact book size. To achieve this, the servo drive is combined with the servo motor, allowing maximum power to be delivered from the minimum area. This can save up to 50% of the space in the machine control cabinet.

With a selection of fieldbus communication and encoder cards, the Lexium 32 range adapts to a variety of architectures.

Designed to simplify the life cycle of machines, Lexium 32 is integrated into SoMachine, Schneider Electric's automation tool for efficient machine engineering. Side-by-side mounting and colour-coded plug-in connectors make installation, set up and maintenance easier.

These new products are also said to work seamlessly with the book style Altivar 32 range of variable speed drives.

Designed for advanced mid-range machines, the ATV32 range covers asynchronous and synchronous motors with ratings ranging from 0.18kW to 15kW. A key feature is the slimline book style of models up to 4kW. Models up to 1.5kW represent an industry first with a frame width of just 45mm offering the smallest footprint on the market.

www.schneider-electric.co.uk

Tooling method speeds prototyping

Polymer specialist igus has developed a new tooling method for injection moulding by which custom designed parts can be delivered in less than 24 hours.

The speed of the process derives largely from the use of aluminium mould tooling, sophisticated CAM systems and rapid quotation and delivery. The designer selects the material best suited to the application, using a simple online selection tool, specifies the required quantity and provides a 3D CAD file of the part.

igus currently manufactures speedigus parts in eight common iglidur materials (iglidur G, J, W300, X, M250, P, A180 and H2) as well as igumid G, the igus E-Chain material.

Ideal for orders up to a few thousand parts, prototypes or one-offs, speedigus can accommodate parts that fit into an envelope up to 475 x 750 x 200 mm, with wall thicknesses down to 0.5 mm. All that is required for a quotation is a 3D CAD file, preferably in STEP format, and the required quantity.

Standard speedigus tooling lead time is 15 days from placement of order, but parts can be produced in less (although costs are weighted accordingly).

www.igus.co.uk/speedigus

Fasteners create the right angles

PEM R'Angle fasteners provide efficient and reliable methods to create permanent right-angle attachment points in thin metal assemblies or printed circuit boards. The product line includes self-clinching types for use in thin metal sheets and ReelFast SMT surface mount fasteners for use with PCBs.

The R'Angle clinch fasteners for metal applications offer cost-effective alternatives to bent tabs at edges of sheets, bent tabs in the middle of sheets, bent flanges, right-angle brackets, or tack welds. The R'Angle SMT versions for board applications can eliminate the need for conventional angle brackets or threaded right-angle blocks.

For metal assemblies Type RAA aluminium clinch fasteners install in aluminium sheets as thin as 0.04in/1mm and accept threadforming screws in varioussizes. Type RAS steel threaded fasteners install in aluminium or steel sheets as thin as 0.04in/1mm.

www.pemnet.com

Solution to last month's Coffee Time Challenge

The Portable Train Weigher or PTW is one of a family of products developed by Sheffield company Weighwell.

It consists of load cells which are attached to the insides of the rails, in such a way that as long as a train passes reasonably slowly, the weight of each wheel is briefly taken by the flange as the flange passes up a small ramp, onto the section with the load cell and down a second ramp. The load cells are held in place by a pair of expanding rods, placed between the rails. The extension is accomplished by rotating large nuts which ensure the extension of screw sections. When the load cells are in place, the screws are locked into position using lock nuts.

The development of the system was aided by DTI 'Smart' innovation awards in 1995 and 1997. The device is approved by Railtrack and widely used in the UK, Continental Europe, the Far East, Australia and the USA.

www.weighwell.co.uk

Are you trusting to luck?

When things go wrong, they generally do so rapidly. This makes it essential that maximum use is made of simulation and formal risk assessment and that systems are designed to help human operators do the right thing.

Training, knowledge and the right information supplied in the right place at the right time are often all it takes to ensure that the manufacturing system functions without mishap, the plane lands safely, and the malfunction on the oil rig comes to nothing more than a note in a report and a story told over drinks.

Get it wrong and the very least designers can expect is having to defend their shortcomings to management, if not to a law court. Good tools to avoid disaster are widely available, some of them free, so it would be wise to make use of them.

The disaster in the Gulf of Mexico that started to unfold on April 10th 2010 when a blowout sank Deepwater Horizon is a case in point. While the enquiries and court cases will probably go on for years, it is apparent that an operation that should have been routine went wrong. A number of engineering failures conspired to kill 11 people and cause possibly the worst oil pollution incident in history. In the words of BP chief executive Tony Hayward: "The honest truth is that this is a complex accident, caused by an unprecedented combination of failures." The same can be said of most aircraft accidents, most shipping losses, most accidents with machinery in the industrial workplace and a large number of car accidents.

BP says it has been investigating seven separate aspects of the mishap, most of them connected with the Blow Out Preventer, a massive assembly of valves and rams that sits on top of the well casing on the sea bed. If things go wrong, it is designed to shut off the flow of oil and gas from the well head automatically and, if that fails, cut through and block the riser pipe. Because it is so crucial, it should be tested regularly – even every day.

Tim Southam, proprietor of human factors and ergonomics consultancy Progress Through People, asked of the events that led to this disaster: "Was it tested? What was the emergency response? Blowouts have happened before and have been dealt with successfully, but there have been problems with sea bed shuttle valves for a long time." He spoke of the need for simulation to model disasters on a computer or, better, learning how to deal with them in a realistic virtual environment. He also spoke of the need for practice and the development of good habits so they become what he called 'a sub conscious routine'.

A retired RAF Squadron Leader, much of Southam's knowledge has come from hands-on experience with aircraft and human factors research at the Royal Aircraft Establishment at Farnborough. Much of his present work is with the oil and gas industry. Preventing serious accidents, he said, starts with engineering design and some apparently simple questions. "How are alarms handled? How is the design of the interface? Is instrumentation confusing? Is a crucial valve 15 feet up in the air?," he asked. As an expert on human factors, he is concerned with how people respond to emergencies, noting that, to complicate matters, different people are liable to respond in different ways according to gender, nationality, education, upbringing and organisational culture. There is also a need to consider the fact that tired operators are likely to perform more poorly than rested operators. He noted that lack of sleep reduces communication by 30%, the making of valid judgements by 50%, the remembering of facts and figures by 30%, and attention to alarms by 75%.

Clearly, one of the crucial factors in preventing disaster in any critical situation is presenting the right information to operators so they have time to make use of it and much research has been undertaken by NASA into both routine and emergency procedure checklists and how these should best be presented to aircrew. Most of these are in the form of paper cards, held in the pilot's hand. There have been numerous attempts to develop products that could automate checklist generation and checking off, culminating in Boeing's Engine Indicating and Crew Alerting System and the even more sophisticated Airbus Electronic Centralised Aircraft Monitoring system (ECAM).

Similar solutions can be applied in other situations. For instance, a working illustration of electronic management technology, including the handling of fire alarms, can be found in Rockwell Automation's Demonstration Suite in Milton Keynes. Rockwell is probably best known

Blow out preventers are designed to shut off the flow of oil and gas from the well-head automatically and, should that fail, to cut the riser pipe. BOPs should also be tested regularly. The failure of such a system on the Deepwater Horizon rig has led to the sinking of the rig and one of the worst environmental disasters in history.

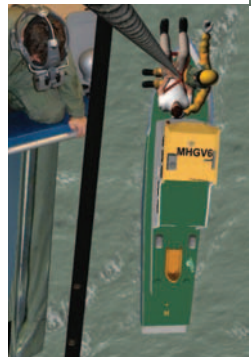
It is in the nature of things to go, wrong, but there are ways to minimise the risk of a mishap turning into a disaster. Tom Shelley reports.

Pointers

- Automated generation of 'To do' lists in the event of an emergency is a capability that has been commercially available for years.
- The Machinery Directive has led to the requirement to make formal assessment and quantitative estimation of risks in the design of machinery. The same techniques bring benefits to all kinds of engineering design.
- Failure to plan to cope with emergencies can be disastrous for human operators, disastrous for the environment and disastrous for business.

to readers for its industrial automation systems, but these same systems are equally applicable to control and management of almost anything. According to Rockwell's Andrew Smith, as well as managing CCTV, public address systems, escalators, doors and fire alarms, in the event of a fire, a control system managing a railway station is designed to be able to come up with a 'to do' list.

Such a system, based on use of ControlLogix, has been installed and used by Heathrow Express for 12 years. Smith said that it has been substantially modified and expanded since its original installation, something which is made easier by basing it on standard software and a standard PLC system. The construction of Terminal 5 saw the system further expanded. The network now covers a geographical area of some 25 sq km and comprises 53 PLCs, with tasks including management of the tunnel ventilation system.

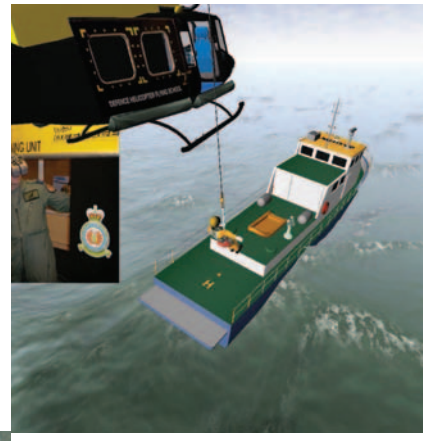


ICS Triplex, now part of Rockwell Automation, applies such technologies to industries that include oil and gas. Allan Rentcome, director of SSB Technology, explains that ICS Triplex produces two main technologies for Process Safety. Trusted uses a triple modular redundant architecture – IEC 61508 SIL (Safety Integrity Level) 3 – which, he says, is 'very successful in the oil and gas industries'. The other is AADvance, which is scalable from small systems to thousands of I/O points and is suitable for IEC 61508 SIL categories 1 to 3, including the ability to be configured as a triple modular redundant architecture.

Rentcome says ICS Triplex's solutions, which include sophisticated self-testing and diagnostic capabilities, can only form part of the chain, the other parts being risk assessment, proper design methodology, maintenance and routine testing. Strategies can be built into the software to organise maintenance and testing and documentation that this has been done.

In an industrial automation environment, application of the Machinery Directive to machine and automation system design has ensured that potentially dangerous machines have sophisticated control and safety systems that can be relied upon to shut them down if anything goes wrong or they are accessed or used improperly.

However, shutdown is not always the safest response to emergency. Applying the disciplines imposed by formal risk assessments, such as those required by the Machinery Directive and standards EN ISO 14121 and EN ISO 12100, can go a long way towards ensuring safety. According to Paul Considine, electronic sales specialist with Wieland Electric, this process can be greatly assisted by the availability of the tool SISTEMA – Safety Integrity Software Tool for the Evaluation of Machine Applications – available as a free download from the website of the IFA – the Institut für Arbeitsschutz (Institute of Safety at Work) in Germany. This software determines risk parameters such as those for determining the required performance level (PL), measures against common-cause failures on multi-channel systems, mean time between dangerous failures, and the average test quality of components and blocks. These factors are entered step-by-step in dialogues and each parameter change is reflected immediately on the user interface with its impact upon the entire system. Users are spared time-consuming consultation of tables and calculation of formulae, since these tasks are performed by the software.



Virtallis' 3D ActiveCube system can be used to train operators in how to deal with difficult or dangerous situations

But, according to Rentcome, it is not enough to look at single machines, such as the now notorious blow out preventer that was beneath Deepwater Horizon or even control computers and networks. "Instead," he says, "success is achieved by providing a complete solution and we like to be involved early in the process." He said ICSTriplex can provide a 'complete lifecycle solution', including not only the design of its part of the hardware, but also maintenance, testing, management, and support for the project through to de-commissioning. In fact, Rockwell has a 'mission control' room at its Milton Keynes headquarters, which allows the demonstration of how such systems, processes and equipment might be deployed in an industrial context.

As mentioned earlier, simulation is often key to discovering whether emergencies can be adequately coped with under realistic conditions and thus should often be seen as an essential part of the design development and risk assessment process. Virtalis, originally spun out of the National Advanced Robotics Research Centre in the late 1980s, has particular skills in this field.

At a Showcase event at Northampton University, Virtalis demonstrated a large projected ActiveWall telewall, viewed in 3D using shutter glasses, a 3D cave called ActiveCube, tracking of body movements using a Vicon camera system and reflective markers, and how to train helicopter winch men in a head-mounted immersive 3D environment. The company's particular skill is in being able to work with a range of 3D software, including that produced by Dassault Systèmes and Autodesk, and hardware interfaces that include iPads, iPods and iPhones. Virtalis technical director Andrew Connell used an iPad to control all three systems installed at Northampton during the demonstration day. While training and hazard assessment in a virtual environment is never the same as the real thing, it does reveal which tasks are likely to be difficult to execute.

www.progressthroughpeople.com
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www.icstriplex.com
www.wieland-electric.com
www.dguv.de/ifa/en/pra/softwa/sistema
www.virtalis.com

Nano man

Following a career in materials science research at DERA during which he was awarded the Donald Julius Groen prize from ImechE, Martin Kemp moved into corporate marketing for QinetiQ, including a secondment to the European Commission, before spending five years with DTI Global Watch Service developing international technology transfer in the high performance engineering sector responsible for Western Europe. As a Chartered Marketer, he has 12 years experience in technology transfer including commercial exploitation of IP.

Nano gets bigger

Nanotechnology is here and now. Paul Fanning talks to Dr Martin Kemp, who is seeking to help the technology make the leap into the industrial lexicon.

What does' nanotechnology' mean to you? For some, it may still be a word associated solely with science labs. To others, it may be a concept that is vaguely understood, but not considered of any great relevance to their day-to-day working lives. For a few, however, it may be an area of exciting design possibilities.

Bringing these groups closer is the work of the Nanotechnology Knowledge Transfer Network, which seeks to build a supply chain for the technology, securing applications for this technology in the 'real world' of engineering. As theme manager – engineering, energy and environment for the NanoKTN, Dr Martin Kemp has specific responsibility for this and it is a subject on which he is evangelical. "Nanotechnology, to my mind, is an industrial revolution," he says.

One of the factors to which Dr Kemp points in this field is that nanotechnology is already playing a significant part in our daily lives – albeit largely unbeknownst to us. "The number of end user applications is increasing every day," he says. "And many of those you're already using at home and you don't know it. The obvious one is sunscreen. You can buy a SPF 30 or 40 sunscreen and now, and instead of being white because it's made up of large particles, it's clear. You get the same UV protection and the aesthetic benefit of not having white arms. And if you look at that functionality of what you're achieving versus the cost of realising it, most people look at the higher added benefits initially, so if you're getting a major benefit then that's the one to target first."

Nonetheless, Dr Kemp is acutely aware of the knowledge gap in this area. Some of this he puts down to a fundamental failure to grasp the possibilities, saying: "The analogy is when polymers and composites were invented. For people who had previously just used metal and wood, understanding what those new materials could do for them took decades ... there has to be a creative step taken by the end users. Materials producers can produce anything you ask for, but you have to ask – that requires a creative leap. And if you don't know what to ask for, you have a circular conversation of 'What have you got?' 'What do you want?'. It's breaking that circle that's the problem."

He continues: "All emerging technologies start with a technology push – lots of clever ideas. The big key is connecting the market and the end users. Our job is to do that and develop a culture of 'market pull'. So we want the end user to start defining the agenda and sourcing the materials. That's quite a complex process, which is why we have workshops like this. We have various mechanisms to help broker those conversations."

One of the major issues that has had to be overcome with regard to nanotechnology, Dr Kemp believes, is a shortage of definitive design data on nanomaterials that will provide engineers with the confidence to specify them. This is now being overcome, but companies' unwillingness to share their data remains a problem. Says Dr Kemp: "One of the big barriers at first was that people would say 'OK, that sounds great, but where's the design data?'. The trouble is that the design data we've developed up to now has taken 20 to 30 years to develop in a database. And you need to basically do that all over again with any new nano-additive or nano-material. We're starting that process. The larger companies have their own databases, but that information is their own data and they won't release that. So one issue is normally you have to develop one product and test it to get the design data."

"All emerging technologies start with a technology push – ie lots of clever ideas. The key is connecting up the market and the end users."

While many companies retain proprietary information about nanotechnology that they are not prepared to share, this does not mean the technology is hard to access. Now, with companies of the size of Bayer having opened its 200tonne/year manufacturing plant for carbon nanotubes, nanomaterials have become commoditised.

However, says Dr Kemp: "It's an enabling set of tools and you need to use your imagination as to what you do with them. There will be commodity products that are very obvious, such as thermoplastic with a nano filler that has a 10% Modulus increase. And you can just go and buy that and you know the properties… but you're not going to see every possible nanoparticle commoditised. There has to be a creative leap from the end users."

According to Dr Kemp, the UK is now very strong in the ability to develop, prototype and test materials. The Molecular Nanotechnology initiative's network of facilities – funded by the government in 2003 – was a major factor in creating this network. He says: "Most universities now have nanotechnology facilities and they're very much geared up to helping people with material specification.

"We're trying to speed that process up and there are many companies who can help you to achieve your material once the specification has been developed."

www.nanoktn.com

Precision in the Extreme

Accurate position sensors for environments that are too tough for most

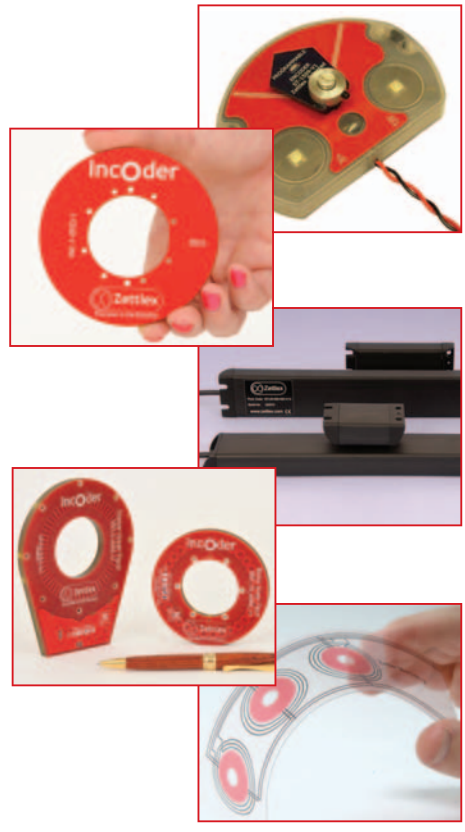
'When the going gets tough, the tough get going' was second choice for the Zettlex company motto. Instead they chose 'Precision in the Extreme' because it reflects both the harsh environments that Zettlex sensors work in as well as their high accuracy.

Inductive sensors are chosen instead of potentiometers, optical or capacitive sensors because they are more rugged and reliable. That means traditional inductive sensors - such as linear transformers and resolvers - are nearly always chosen for the most demanding or safety critical applications in aerospace, defence, oil & gas equipment. However, traditional inductive sensors are either too expensive, too bulky, too heavy or not accurate enough for many mainstream applications in industrial automation and process control.

Zettlex sensors use a unique inductive technology to contactlessly measure the position or speed of a target. Rather than the bulky and heavy wire-windings used in the traditional inductive sensors, Zettlex sensors use printed, laminar constructions. These can be made using reel to reel processes on films of 0.1mm thick. This enables sensors with the same environmental performance as the traditional inductive sensors but at a fraction of the cost, size and weight. A further advantage is that because the printing methods are so repeatable, the accuracy of the Zettlex technology is also higher accuracy.

Zettlex sensors range from simple single turn rotary devices through linear, multi-turn, curvi-linear, 2D and even 3D sensors. Measurement ranges span from microns to metres.

Of particular appeal to many OEMs is that Zettlex sensors need no precision installation of mechanical protection since the unique measurement technique is stable irrespective of temperature, humidity or foreign matter. Sensors have been made for extreme temperatures from -55 to 230Celsius and simple epoxy potting makes the sensors ideally suited to long term, deep immersion or potentially explosive (ATEX) environments.



Zettlex UK Ltd. offers position sensors with an unparalleled price/performance point:- no contacts, no bearings, no seals, no maintenance, no precision installation..... just reliable measurements - all day - every day.

- Single & multi-turn rotary sensors
- Linear & curvilinear sensors
- 2D & 3D sensors
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Zettlex UK Ltd.
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E info@zettlex.com
W www.zettlex.com

Oscillation saves lives

Tom Shelley reports on how pneumatic logic is being applied to helping injured people breathe without electric power.

A gas-powered ventilator is available that uses only the energy available in a compressed gas bottle to keep injured patients alive in emergency situations where electric power and major medical facilities are not available.

Fully controllable by turning valve knobs, it also an example of how automation functions can be achieved and controlled purely by using pneumatic logic.

It has been developed by Parker's KV Division and has a base made of moulded, aluminium filled polyurethane, with surface-mounted or embedded valves, depending on requirements.

Its sole power source is a bottle of compressed air. Air from the bottle is admitted to a reservoir, where it builds up until the pressure causes a valve to switch, initiating inspiration (breathing in). The rate of pressure build up is controlled and adjustable. The system has a downstream flow control valve that delivers gas at low pressure to the patient. This is calibrated along with the inspiration time to control the tidal volume of delivered gas. A patient pressure relief valve limits any over pressure if the patient's airways are blocked.

Expiration is initiated when air from the gas bottle fills a second reservoir until a second valve opens. No pneumatic suction is applied. Expiration depends only on the natural compliance of the lungs. This phase is typically 1.6 to 2 times longer than the inspiration phase.

Breaths per minute and tidal volume are adjusted by turning valve knobs. The modules are designed to give a constant inspiration to expiration ratio over a range of breathing rates and airflows.

Asked how relevant this approach is to more traditional automation problems, Clive Schofield, country manager and market development manager life science for Parker's KV Division, responded: "Historically, many different applications can use pneumatic logic, but it is now generally integrated with electrical solenoid control. Pure pneumatic logic is now generally confined to systems where there is either only a gas supply, such as emergency ventilators or aircraft safety systems, or systems that need to be intrinsically safe, with no electrical switching.

The ventilator is an example of what can be achieved and controlled purely by the use of pneumatic logic.

"We currently supply this type of system to customers in the aerospace maintenance market, for portable fall arrest safety systems, and the bulk tanker delivery market. These systems rely upon having no electrical supply either available or permitted for safety reasons. The applications require pneumatic logic and timing functions to switch valves at pre determined intervals."

When asked how many lives the emergency operations gas powered ventilator might save, Schofield said: "This is difficult to quantify and we have no specific figures, but it could be into the thousands per annum."

www.kvglobal.com

Design Pointers

- Pure pneumatic logic is used to control an emergency deployment personal ventilator that is powered by a compressed air bottle. No electrical supply is required or used.
- The same type of logic may be used in environments where electrical supplies are undesirable for safety reasons, or where emergency operation is required in circumstances where the electrical supply may have failed.

Shows spotlight clean, efficient power

Tom Shelley reports from the IFPEX and Air-Tech exhibitions.

Saving energy and protecting the environment were the two key trends in hydraulic and pneumatic developments at this year's IFPEX – Air-Tech show.

By the entrance was a stand devoted to the Exhaust Air Recycling System, or EARS, invented by Australian Chris Bosua. This reduces energy consumption by recycling partly compressed exhaust air instead of venting it to atmosphere. Bosua claimed the approach was already finding applications, but rather less so in the UK. While small systems cut energy costs (Bosua estimates a 7.5kW system would only consume £2,100 worth of energy costs in a year as opposed to £4,000 using a conventional system) a larger system could additionally allow the purchase of a smaller compressor, so payback time could be 'a couple of months'. Presently, the only significant commercial customer identified in the UK is Kingpin Tyres, a remould company in Shropshire, but Tom Parker Ltd has recently purchased the UK distribution rights.

Less radical, but equally effective in installations with multiple air compressors, is a Belgian-developed control system marketed in the UK by EnergAir Solutions. UK manager Pete Tomlins explained that 20-30% savings are not uncommon when a single controller is used to switch individual, fixed-speed compressors in a joint system in and out of service. Similar savings can be achieved when the controller is used to regulate the speed of one or more compressors powered through variable speed drives. System setup begins by monitoring the electric current being consumed by each compressor and the pressure delivered. After this, an audit shows how much energy is being wasted.

The other common feature in many of the offerings to be found at the shows was environmental concern. Bambi Air Compressors showed its totally enclosed 'silent' air compressors, most of which generate no more than 40dB(A) of noise. Typical applications include supplying compressed air to open doors in residential homes or t-shirt printing in high street shops. The company also supplies oil-free compressors that are slightly noisier, typically generating 53dB(A). Applications include supplying air to pneumatically-actuated valves in landfill gas systems and water treatment plants..

Several companies had new oil water separators to allow cleaned condensate to be discharged without incurring penalties for discharging water containing oil. Filterworld showed the company's new, British-made Magnasorb separators that remove oil by passing condensed water through a convoluted path. Oil remains in the filter cartridge in the canister. When it is full, it can be disposed of. Since the water is flowing, there is no stagnant water in the devices to harbour bacteria. The absorbing media used are a primary, porous, polymer-based material that absorbs oil, but rejects water, and an active, carbon-based secondary element.

Close by was another company, Condensate Systems, which claimed to offer what managing director Richard Turner described as 'the lowest-priced condensate cleaner on the market'. British designed and made, Sepura's 'SEP 60' features a patented oil adsorption medium based on recycled glass, which is claimed to be up to three times as effective as active carbon. Designed for system capacities of up to 60cfm = 10kW – where it has a service life of 5000 operating hours or up to one year – it brings legal compliance within economical reach of many thousands of smaller compressor users.

***Above:** Filterworld's Brtitish-made Magnasorb separators remove oil by passing condensed water through a convoluted path.*
***Below left:** Bambi's silent air compressor.*

In the field of hydraulics, Mike Retford, sales and engineering director of MGR Fluid Power, claimed water is coming back into vogue again as an alternative working fluid to oil. Water, the original working fluid in hydraulic systems, has gained popularity, particularly in the oil and gas industries or where where there is a great risk of fire, such as in the high temperature forging presses used in the aerospace industries. Water is more erosive than oil, but Retford pointed out that new hard coatings developed by the US company BOC Water Hydraulics have overcome many of the problems, and the rising price of hydraulic oil is seeing renewed interest in water.

www.ukears.co.uk
www.kingpin-tyres.com
www.tom-parker.co.uk
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www.filterworld.co.uk
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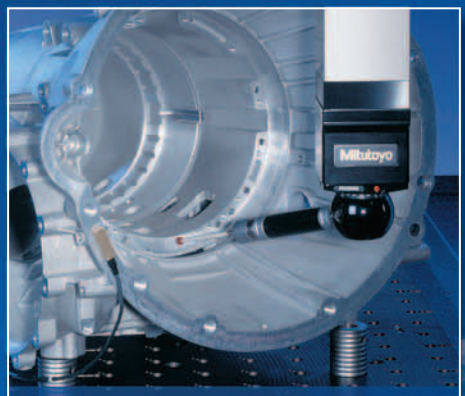
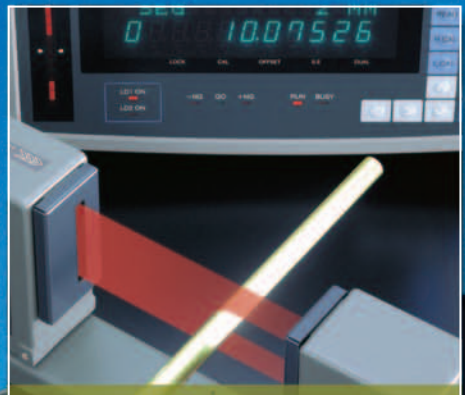


Coordinate Measuring Machines

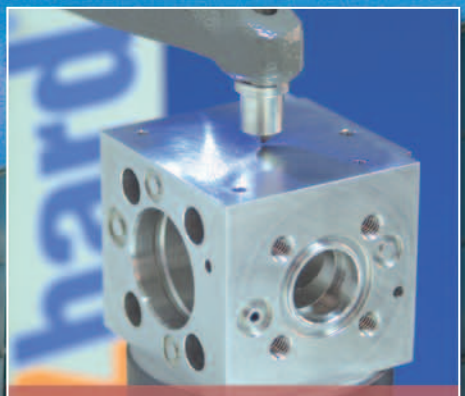
Vision Measuring Machines

Form Measurement

Optical Measurement



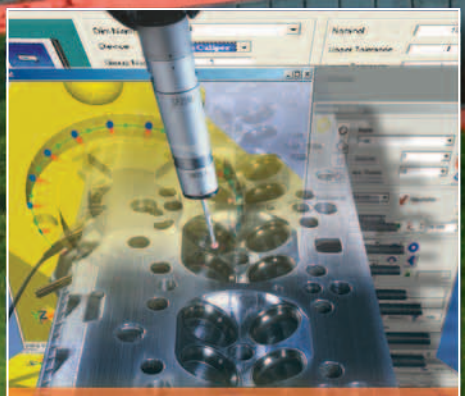
Sensor Systems



Test Equipment and Hardness Testers

Digital Scale and DRO

Small Tool Instruments



Software

Support Services and Training

Mitutoyo (UK) Ltd
West Point Business Park
Andover, Hampshire
SP10 3UX, United Kingdom
T +44 (0)1264 353123
F +44 (0)1264 354883
enquiries@mitutoyo.co.uk
www.mitutoyo.co.uk

Mitutoyo

Sensors offer off-the-shelf accuracy

High-accuracy, new-generation inductive sensors are soon to be available in an off-the-shelf product. Paul Fanning reports.

A generation of inductive sensors, designed to allow accurate measurement in challenging conditions, will shortly be available in an off-the-shelf product.

'Precision in the extreme' is the claim of sensor manufacturer Zettlex UK and this principle is very much at the heart of the company's new generation inductive sensors. These essentially use the same principles as traditional inductive sensors, offering good, non-contact measurement performance irrespective of the operating environment. However, rather than use bulky spools of wire, Zettlex sensors use printed circuits on flexible or rigid substrates.

The transition to printed windings brings with it a number of advantages. Amongst these are: a reduction in size, weight and production cost; the eradication of sources of inaccuracy from the winding process; the ability to achieve complex measurement geometries, such as curvilinear, 2D & 3D position sensing; and the ability to locate multiple sensors in the same space by using multi-layer circuit boards.

Perhaps the most significant benefit, however, is the flexibility of form afforded by the

technology. As Mark Howard, Zettlex's general manager (pictured above) puts it: "We are taking Faraday's maths and applying it in such a way that you can have any shape you want." While this ability has given Zettlex a number of what Howard calls 'design wins', it has also, he feels, become something of a burden. "We've foolishly been telling customers that they can have any shape they want. That's OK, but supporting those types of project takes a lot of effort and that could limit the size of the company."

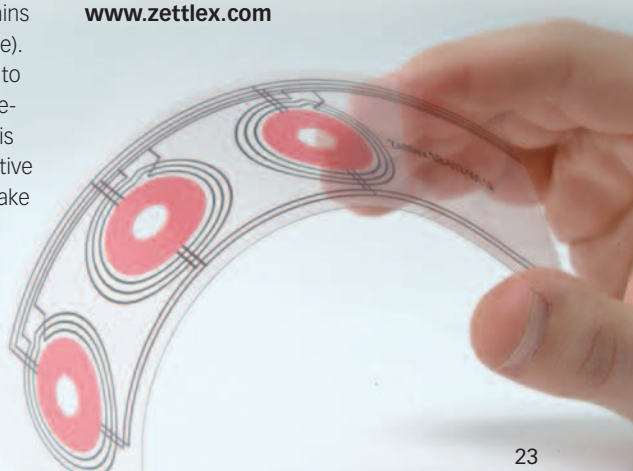
The technology is not new, having previously only been supplied on a bespoke basis in applications ranging from aerospace, defence and industrial to 'the world's most expensive record player', on which it provides the turntable control (because the sensor contains no bearings that might pick up on the needle).

With this in mind, Zettlex is now seeking to move its technology from bespoke to off-the-shelf products. The first of these to emerge is IncOder, a high-accuracy, ring-shaped inductive encoder designed as an alternative to pancake resolvers. Intended for launch at this year's Farnborough Air Show, the encoder's unusual shape is aimed at engineers who are struggling with tight spaces or a restricted design envelope. For example, the engineer may need to pass drive shafts, bearings or cables through the space where traditional rotary encoders might sit.

Clearly, there is no shortage of options when it comes to position sensors. However, says Howard: "There's a problem with pretty much all of them: potentiometers are good where you have a benign environment; with optical, you need a clean environment; magnetic sensors aren't always as accurate as they could be, because magnets vary from one to the next – plus they need really good mechanical alignment; capacitive sensors are too temperature- and humidity-sensitive; and strain measurement is a nightmare to set up.

"Inductive sensors are always chosen for large and expensive safety-critical applications and we are taking the expensive and large out of that. The market we're going after is where people want to measure accurately in difficult or dirty conditions."

www.zettlex.com



Sick sensor delivers precision and speed

Sick UK's new OD Precision and OD Value sensors meet maximum accuracy and speed demands when measuring objects in the micron range. The OD series is suitable for applications, including robotics, the electronics, automotive and packaging industries.

The sensors can be used to monitor the presence and position of objects as well as measuring profiles, diameters and width. The innovative range can detect the slightest unevenness and the smallest deviation or indentation, making it ideal for use in quality inspection, where micron-accurate detection capability matters, such as in-line quality inspection, process regulation or product classification.

The series offers a total of eight sensor head variants for five different measurement ranges, from 24 to 26mm to 300 to 700mm, and resolutions of micron accuracy.

www.sick.co.uk

Thermal imager gets new features

Micro-Epsilon has enhanced its inline infrared thermal imaging camera with a host of new features, accessories and mounting options, including a protective enclosure that allows the device to operate in ambient temperatures up to 200°C – making the unit ideal for monitoring the temperature of steel, ceramics and glass.

Powered and operated via a USB 2.0 interface, the thermoIMAGER TIM160 is an inline radiometric thermal imaging camera that provides temperature images and profiles of a target area. Micro-Epsilon is now offering it with a variety of new features and accessories. Rather than supplying the device with a single factory calibrated optical lens, the user now has the option of up to three interchangeable lenses (9, 31 and 64° field of view). The three interchangeable lenses cater for every possible field of view for temperature monitoring tasks.

www.micro-epsilon.co.uk

Smart camera for fast codes

The reading of fast-moving labels is a common challenge encountered by smart cameras in practical applications. The new LSIS 422i from Leuze electronic reliably masters this task and offers all of the advantages of the LSIS 400 series, such as the practical Web-based configuration with a standard browser.

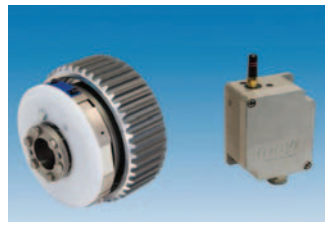
The LSIS 422i smart camera simultaneously reads up to 99 2D Data Matrix codes or barcodes on each image. As a result, it can be used anywhere various labels need to be detected and evaluated at high speed. Both the very short exposure time of just 54 µs as well as the device software contribute to the performance.

www.leuze.com

Providing precise torque limiting

Providing precise torque limiting to ensure that the loads on components do not exceed allowable levels, safety clutches have up to now required an external limit switch and associated cable to send a signal to the controller if an overload situation occurs. The new EAS-Sensor safety clutch with integrated signal transmitter sends the overload signal wirelessly.

The sensor's limit switch is integrated directly in the clutch. It detects the disengagement motion of the clutch in case of overload and transmits the signal wirelessly to a base station connected to the machine controller. The EAS-Sensor is adjusted in the factory for proper operation, eliminating the need for assembly and



adjustment effort. Overload sensing is fully reliable. External factors such as vibration or axial offset of the clutch, which for example may result from thermal expansion of the shaft, do not impair operational reliability.The transmitter of the new unit, including its power supply, is entirely contained in the torque adjustment nut of the proven EAS-compact safety clutch.

www.mayr.co.uk

Current Sensors measure up

Premo has enhanced its current sensors product range with the newest HCT-1000-SH series, a high current closed loop Hall Effect Sensor. New market trends are going to the high-current and high-frequency devices, making a must to test and measure with excellent accuracy current levels up to 1000A with any type of waveform.

By means of closed loop solution, the high accuracy and linearity is guaranteed, keeping values as low as 0.1%. The current sensor allows overload capabilities with a measuring range up to ± 3000A. The HCT-1000-SH current sensor is fully isolated with plastic housing, meeting isolation values higher than 4000 Vac.

www.grupopremo.com

Welding techniques boost aerospace

British-developed technologies allow the fabrication of rocket fuel tanks and nozzles as well as ground-based products. Tom Shelley reports.

Large aluminium lithium sections for rocket fuel tanks being developed for NASA depend on friction stir welding, while upper stage nozzles for Ariane 5, are being welded using a UK laser technique that allows a vision system to guide welding when no features are discernible.

These techniques not only advance the use of weight-saving living aluminium lithium alloys for general aerospace use, but also the improved manufacture of very high-precision metal fabrications generally.

Crucial to NASA's fuel tank project is the production of two single-piece, 5.5m diameter spin-formed domes manufactured from flat plate blanks made from friction stir welded commercial 2195 aluminium copper lithium manganese plate. While 2195 is only 5% lighter than the 2219 aluminium copper manganese alloy used presently, it is 30% stronger at cryogenic temperatures.

The current method of making a fuel tank dome is to weld eight wedge-shaped pieces of 2219 alloy together. This requires 10 welding steps and multiple operations and inspections. In addition, the approach uses plasma arc welding, which is problematic for aluminium lithium alloys because of the ready take of oxygen by the lithium. Friction stir welding gets over this problem, and is to be used in the manufacture of the complete tanks, which are expected to be 25% lighter than those made conventionally, and significantly less expensive.

The project was conceived by engineers at NASA's Marshall Space Flight Center and the Langley Research Center. The parts are being manufactured by MT Aerospace in Germany, which owns the patent on the concave spin forming process.

The manufacture of the Ariane rocket nozzles by Astrium posed different problems. Each one is

made from 242 nickel alloy tubes, 4mm square and with a 0.32mm wall thickness, allowing cooling in flight by liquid hydrogen. A totally reliable method of joining them is essential if such a system is going to work. Before welding, the tubes are bundled together and spiral wound around a copper coated aluminium mandrel.

The Kuka robot carrying the welding torch is guided by a 'Meta-Scout' vision system supplied by Meta Vision Systems. During most of the process, the vision system can resolve between adjacent tubes and follow them conventionally. However, near the engine end of the nozzle, the tubes are flattened to achieve the correct fit, and there is no visible feature to track.

In this region, five laser lines are projected onto the workpiece to allow measurements to made in six degrees of freedom (three orthogonal, and three rotational). A structured light technique, together with grey scale vision analysis, establishes seam position, height and orientation with respect to the tool. The only requirements are that the material on either side of the gap must have similar machined finishes and the sensor has to be oriented at close to 90° to the surface.

Software allows the path to be predicted and followed to an accuracy of 0.1mm. Weld parameters are automatically selected to suit gap dimensions. A calibration system aligns the sensor with the welding torch and calculates any deviation of the tool centre point.

Similar systems are in widespread use in various industries, where they facilitate extreme precision welding, including the manufacture of ducts for the Airbus A380 and the reconditioning of land-based turbine rings in the US.

www.nasa.gov/centers/marshall/home/index.html
www.twi.co.uk
www.meta-mvs.com

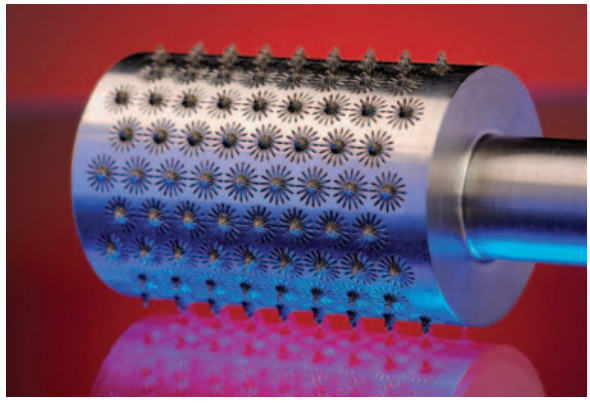
Design Pointers

- Friction stir welding is being used to manufacture large fuel tanks out of a commercial aluminium lithium alloy for space use, reducing weight by 25% and cost by a significant amount.
- Automated welding based on a British vision system that tracks laser stripes can be used to achieve 0.1mm in another critical space oriented manufacturing operation.

Sculpted surfaces produced by beams

Tom Shelley reports on progress with a process for producing metal surfaces with protuberances and pits that is finding commercial use.

Laser and electron beam sculpting of metal surfaces allows them to interlock with materials with which they would not naturally bond. This is an advance of considerable relevance to makers of surgical implants, while the surfaces can also be used to generate structures that alter fluid flow over a surface, enabling improved efficiency in heat transfer while minimising fluid flow resistance.



A set of techniques called Surfi-Sculpt has been under development for some years at TWI in Abington. The basic technique is to use a fine, high-intensity beam of electrons or light to melt a small area of surface and then to move the beam onwards quickly. Owing to vapour pressure and surface tension effects, this leaves an intrusion or depression where the beam impacts and a mound or protrusion behind it.

Electron beams are scanned using magnetic fields in a vacuum, but laser beams are scanned using galvanometer mirrors and can be used in air or inert gas. There is a problem in that laser beams need to be focused and distance to the target varies with angle, but flat field lenses have been developed that have a wide working range without the need to refocus.

Most of the work done at TWI to date, however has been with electron beams. Because the electrons penetrate a small distance into the material, they both heat and melt a small volume of material at the same time, whereas a laser beam applies heat only to the immediate surface.

About 10% of the available beam energy is used to move material and losses through backscatter and other effects are thought to be about 30%. Using an electron beam, it is possible to make textures of 500 to 10,000 hole/protrusion pairs per second, with just one visit of the beam to each location.

Special electron guns have been optimised for Surfi-Sculpt processing, which produce smaller and more intense beams than are normally available for electron beam welding. Cambridge Vacuum Engineering has a licence to produce these guns and has built several electron beam machines for those processes that are in current production use.

Commercially, Thermacore Europe is exploring the use of the process for a number of different heat exchanger products and is in the process of testing prototype liquid cold plate heat exchangers. The customised surfaces are designed to improve the performance of the heat exchanger without increasing the size of the product. Because the process is completely flexible, it is possible to produce fins that maximise heat exchanged and minimise fluid drag on a micro or millimetre scale.

The process has attracted significant interest from manufacturers of orthopaedic implants, where the surfaces have the potential to improve the joint between implant and bone. Other uses include TWI's Comeld process for improving the joining of metals to composites, with such bonds showing greater integrity than when fasteners or adhesives have been used.

www.twi.co.uk
www.camvaceng.com
www.thermacore-europe.com

Lightning set to strike CAD market

A commitment to 'shake up the CAD market' has been made by PTC. Paul Fanning reports.

PTC's modest promise to 'define the next 20 years of mechanical CAD' was probably the single most attention-grabbing thing at the recent PTC/User World Event, held in Florida. However, precisely what form the next two decades of mechanical CAD will take remains unclear.

One thing about which we can be relatively certain is this initiative's name: 'Project Lightning'. From there, however, things become increasingly vague. The premise, as outlined by the company's CEO-elect Jim Heppelmann, is simple. Speaking at the event, he acknowledged the belief that the CAD market was 'mature', saying: "The truth is, it's become less exciting … but how can it be a mature market, when there are such big unsolved problems?"

These problems, he claims, are usability, interoperability and assembly management: These issues, PTC claims, will be addressed by Project Lightning, which it says will eliminate the lack of interoperability between different modelling options (2D, 3D Direct and 3D parametric) by offering a set of design solutions on a single, common platform, allowing each user to choose the most appropriate paradigm.

Expanding on this theme, Brian Shepherd, PTC's executive vice president of product development, said mechanical CAD has been too focused on the few. Emphasising the need for CAD solutions to be more collaborative, he said rather than force companies to standardise on a single, high-level platform during project management (an approach PTC sees as analogous to 'issuing everyone a backhoe, even if their job was just to plant flowers'), he believes each contributor should be allowed to use the approach best suited to their input.

It seems certain, therefore, that PTC's Windchill PLM offering will form some part of Lightning with regard to assembly management, addressing the problems of designs that may have many hundreds of configurations and do not suit a pure, CAD-based approach by offering 'a simple, robust PLM backbone that will drive the CAD model'. However, it was made clear that Lightning will offer full upwards compatibility with the products currently being used by PTC customers, including Pro/Engineer, CoCreate, Product View and Windchill. Indeed, one of the areas on which the company was prepared to be specific was that Lightning would deliver 'a scalable, interoperable, open and easy-to-use set of mechanical design apps' based on PTC's existing assets.

It was also made clear that Project Lightning is PTC's number one R&D priority and Heppelmann is clearly aggressive in his intention to shift the CAD paradigm, saying: "I want to go back on the offensive in the CAD market and to try and shake up the CAD industry." However, clear indications of the direction this will take remain tantalisingly scarce, although some hints may be derived from some of the comments made.

To begin with, Heppelmann was emphatic that this would not be a purely cosmetic exercise, saying: "We don't think the way to make a product more usable is to refine the icons." Equally, suggestions that Lightning may have something to do with operating using the 'cloud' (whereby shared resources, software and information, are provided to computers and other devices on-demand) would appear to be contra-indicated by Heppelmann's less than enthusiastic – even dismissive – attitude to this relatively recent computing phenomenon.

"I characterise myself as not anti-cloud, but anti-hype," he said. "And nowhere is there more hype in the conversation than when the subject turns to cloud – so much so that I remind people that clouds are made of vapour. This discussion is so hollow sometimes. What problem does it solve? I understand the headlines it generates, but what problems does it solve? For the problems we outlined – ease of use, interoperability assembly management – it is not a vehicle to solve those problems."

Needless to say, this attitude may have been shaped somewhat by PTC's rivals Dassault and Autodesk having embraced the cloud, although Shepherd was somewhat more conciliatory and even left the door open to developments in this area. "We don't sense the customer demand to move CAD to the cloud," he said. "Could that be a facet of our Lightning strategy as we move forward? Time will tell … It's certainly not part of the fundamental problems that we are addressing with Lightning."

Naturally enough, rumours abounded over the exact shape that Project Lightning would take,

"I want to go back on the offensive in the CAD market and try to shake up the CAD industry."
Jim Heppelmann

Jim Heppelmann (right), with PTC's outgoing CEO Dick Harrison.

with suggestions ranging from small, iPhone-style 'apps' that integrate with the existing product line-up to a hybrid parametric/direct modelling interface that allows users to move easily between the two and some closer tie with Windchill that allows greatly improved data management. Another suggestion was that it would feature a more user-friendly CAD program as the base platform, with 2D, direct 3D, parametric 3D, markup, configuration, surfacing, and other components available as modules or apps. At the moment, however, this remains speculation and will continue to do so until 28th October this year, when PTC will be hosting a virtual launch event to reveal details.

> "We don't think the way to make a product more usable is to refine the icons."
> Jim Heppelmann

While Project Lightning caught the imagination, it was far from the only thing to be unveiled at the event. Naturally, many of these focused on expansions of PTC's Windchill PLM platform. These developments are based on new and enhanced solutions built on the Microsoft SharePoint 2010 collaboration platform.

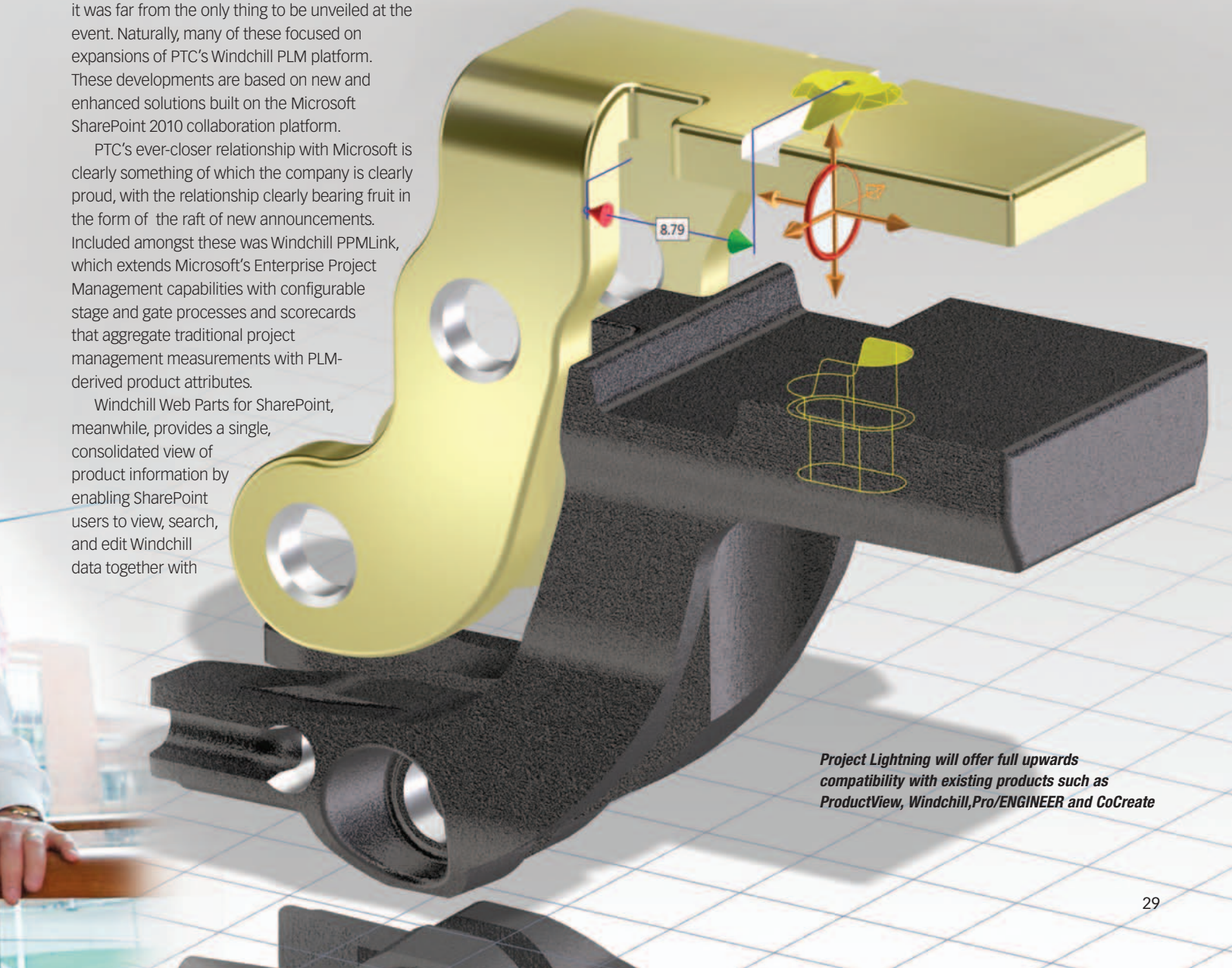
PTC's ever-closer relationship with Microsoft is clearly something of which the company is clearly proud, with the relationship clearly bearing fruit in the form of the raft of new announcements. Included amongst these was Windchill PPMLink, which extends Microsoft's Enterprise Project Management capabilities with configurable stage and gate processes and scorecards that aggregate traditional project management measurements with PLM-derived product attributes.

Windchill Web Parts for SharePoint, meanwhile, provides a single, consolidated view of product information by enabling SharePoint users to view, search, and edit Windchill data together with content from ERP, finance and other enterprise applications. Using Microsoft's Business Connectivity Services, Windchill Web Parts for SharePoint 2.0 offers new and enhanced capabilities that expand the current search, assignment, and executive reporting features and take full advantage of the SharePoint environment.

Another interesting development was in the field of social networking in relation to the product development process. Windchill SocialLink will combine social computing enabled by Microsoft SharePoint 2010 product data and deliver a modern user experience, seamlessly accessible across all PTC solutions. Content tagging, filtering, and activity feeds will automatically disseminate relevant knowledge quickly to product communities and 'communities of practices', self-forming groups united by shared professional interests. PTC also highlighted the success of Windchill ProductPoint, an enhanced solution, to address the specific CAD data management needs of small and mid-sized businesses.

It is clear that PTC sees PLM as an area with great potential for dynamic growth. While acknowledging that it would never perhaps be quite as ubiquitous as ERP software, Heppelmann did say that he believed that PLM would become 'much bigger than most people think it will'. Indeed, at the moment, he suggested that most users were only scratching the surface of its capabilities, saying of deeper usage of Windchill: "How many customers are doing it now? Very few. How many are heading that way? Very many."

www.ptc.com



Project Lightning will offer full upwards compatibility with existing products such as ProductView, Windchill,Pro/ENGINEER and CoCreate

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Design methods optimise cost and performance

Innovative design methods have allowed a bearings manufacturer to cut costs and increase product performance. Paul Fanning reports.

A combination of structured design methods and test analysis techniques have been used to optimise the performance and cost of a range of super-precision angular contact and deep groove ball bearings.

The project was carried out by Barden Corporation for a manufacturer of high-speed rotary machines. The two methods used were the Function Analysis System Technique (FAST) and Design of Experiments (DoE), both are popular systems analysis and problem solving techniques which can be applied to any engineered system, mechanical design or production process.

Normally, Barden would look at the customer's application, designing a bearing solution to suit, then costing the bearing. However, on this project, the customer asked Barden to investigate and develop a range of different high-precision ball bearings and select the most appropriate.

To optimise the cost of the bearings, design engineers at Barden adopted FAST, a method for understanding complex systems by converting the activities needed to a create something to the functions it performs for its customers.

Says Nick Dowding, Barden's business development manager: "First, we had to look at what the bearings were required to do ... we had to ask ourselves questions such as 'What is it that the bearings have to provide the application or machine to make it operate effectively?'."

Once key functions were identified, the chosen method by which the bearing would achieve them had to be listed. Based on this, a list of requirements was drawn up. The completed list included 25 different bearing requirements, including clearances, run-out and vibration harmonics. These functions and requirements were then ranked accordingly.

Next, Barden applied FAST cost optimisation techniques to each function to allocate costs to each function, including raw material costs, inspection and turning of the inner and outer rings. More than 30 separate production steps were considered and scored against functions.

This enabled the engineers to demonstrate to the customer which bearing features were costing the most, but contributing the least to the performance of the bearing in the specific application. Says Dowding: "In effect, you end up with the most important bearing functions at the top of the matrix, which also happen to be the most expensive ones to manufacture. The features at the bottom tend to be the opposite – the least important functions but which are inexpensive to produce. We focused our efforts on the middle range, where the bearing functions were deemed to be relatively important to the application and where the manufacturing costs were relatively expensive."

By this method, it was determined that it was unnecessary to carry out 100% functional testing on every bearing, with sample functional testing deemed sufficient. Similarly, it was agreed with the customer not to inspect all bearings after the turning process, reducing manufacturing costs be reduced while still meeting performance criteria.

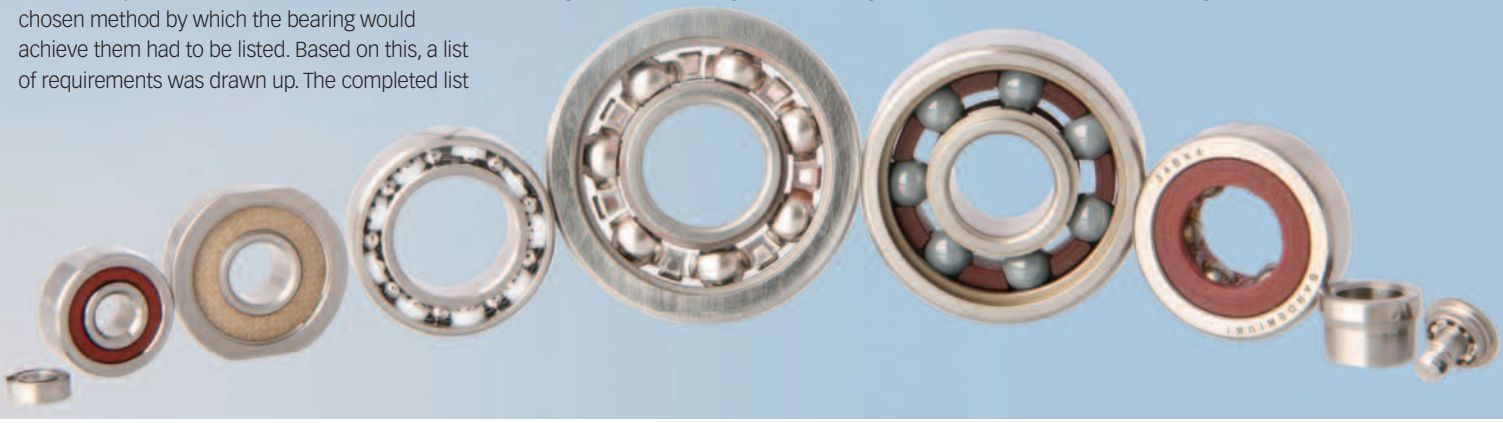
According to Dowding, the project was an 'unprecedented success' and resulted in a range of bearing solutions that were optimised in terms of their performance for a range of machine variants, but which also, on average, cost the customer 10 to 20% less.

Alongside the adoption of the FAST method, designers also used DoE, a series of structured tests in which planned changes are made to the input variables of a process or system. The effects of these changes on a pre-defined output can then be assessed

Because multiple design factors can be investigated simultaneously, this allows identification of factors that have a significant effect, as well as the effect of interactions between factors. Mark Pritchard, senior product engineer at Barden, explains: "This meant that we were able to rapidly study multiple bearing design variables simultaneously, enabling us to optimise a set of bearing designs based on performance and cost metrics for multiple machine models."

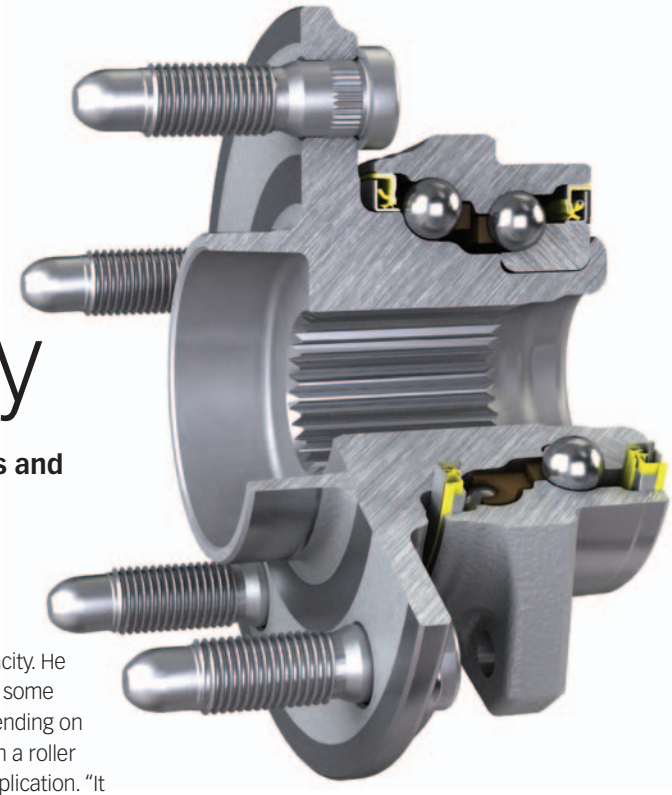
For this project, Pritchard had to conduct 108 separate DoE mathematical models and 72 manual calculations (for validation and verification of optimised settings). The accuracy of the models proved to be in the region of 99% and the result was four optimised bearing designs for each customer machine variant.

www.bardenbearings.co.uk



Five starts to maximum efficiency

Tom Shelley reports on some recent advances in linear systems and bearings that give striking enhancements to performance.



A new linear screw achieves greater performance per unit size and volume by using a fine screw thread with five starts per revolution instead of one, while ranges of new bearings reduce friction by 25% and new bearing based products for the automotive sector contribute significantly to fuel efficiency.

The enhancements come from both improved design and analysis and from tighter tolerance and improved manufacturing to ensure optimum fits.

One of the results of this advanced design is SKF's planetary roller screws, which use a series of threaded rollers to interact with a fine-threaded shaft with five or six starts, to achieve greater forces per unit volume and lower friction than either recirculating ballscrews or nuts driven on shafts with a single screw thread. Having a fine thread means that a screwed shaft is able to offer a higher proportion of its outer diameter to load bearing, as well as reducing opportunities for crack starting. Multiple starts permit faster linear movement for the same angular rotation.

Friction is reduced relative to ballscrews because there is no mismatch between the linear speed of the elements that transfer load from nut to shaft. In a ballscrew, the balls have to go at a different speed in order that they can recirculate. Asked why the thread in the roller screws had five or six starts, rather than one or seven, Marek Pajek, business leader, SKF actuators and drives, replied that five starts was optimal, while six starts allowed the nut to be made smaller, but lowered load capacity. He added that the shaft thread could, in some cases, have two or three starts, depending on the application, but in order to design a roller screw to work best in a particular application. "It is necessary to work with the customer from the beginning," he noted.

One of the applications is in power presses developed by H&T Produktions Technologie. These machines use two, three or four roller screws to apply forces ranging from to 65 to 250 tonnes, with 400 and 600 tonne machines in development. Using roller screws instead of hydraulics reduces noise, vibration and energy consumption, while allowing very precise movements, particularly rapid accelerations and quick stops. It is also possible to coordinate movements of the actuators precisely, even when the loading on the actuators is uneven. Although flow dividers will ensure the delivery of similar amounts of oil to actuators bearing different loads, there is always some tendency for the least loaded actuator to move furthest.

Shaft diameters range from 8mm to 210mm. In a 2 tonne system and the actuators can achieve a precision of 23µm in a 210mm stroke. As well as power presses, the actuators are used in plastic injection moulding machines, broaching machines and on spot welding robots, where they are said to reduce consumption of welding tips by 15% because of their more precisely positioned movements. Typical service lives are more than 20 million cycles.

Design Pointers

- With a fine thread, a screwed shaft can offer a higher proportion of its outer diameter to load bearing, as well as reducing opportunities for cracks to start.
- Multiple starts permit faster linear movement for the same angular rotation.
- Wheel hub bearings manufactured to tighter tolerances reduce friction by 25%

Manufacturing technologies are key in a new range of 'Super precision' ball bearing units for small turbo chargers, which are expected to become the norm for all diesel engines by 2012, plus 25% of petrol engines. The design brief for the turbochargers is running speeds of 240,000 rpm and working temperatures of more than 250ºC. The SKF solution uses a double row angular contact ball bearing unit with ceramic balls which is said to save 2% fuel and 3% CO_2 compared with the current plain bearing solution.

One of the other new automotive bearing products developed by SKF are rocker arms with bearings in steel wheels in cam followers, instead of the direct frictional contact that has been traditional in the past. SKF's first target market for these is motor scooters. The scooter industry has moved from two-stoke to four-stroke engines which require camshafts and rockers. Roller camshaft followers offer reduced wear, friction and noise.

www.skf.com
www.ht-pt.com

• For more information on linear technology, go to www.eurekamagazine.co.uk/linearmotion

The NORD-LOCK Bolt Securing System

Securing Bolted Joints for the Offshore Industry.

It is vital that bolted joints holding subassemblies together remain secure. Bolts need to be easily removable during maintenance, but resist loosening when exposed to vibration and dynamic loads.

NORD-LOCK is a securing system that makes the bolt self-locking. The principle is based on a pair of washers that provide a wedge-locking action meeting DIN 25201, a unique method using tension instead of friction. On one side the washers have cams with a rise greater than the thread angle of the bolt, and on the opposite side there are radial teeth.

NORD-LOCK has become widely recognized throughout the Offshore Industry around the world as the leading bolt securing system on difficult to maintain or safety critical joints. During the last two years we have worked with engineers from many of the industries major companies to help solve problems on a wide range of applications. It is very satisfying when an engineer tells you about an equipment failure caused by bolted joints coming loose when you know you have the solution!

We can offer companies our in house facilities in Malmo, Sweden to test their joint designs. A leading international manufacturer of well head sensing equipment has chosen Nord-Lock to secure its bolted joints against vibration and shock loading. Traditional bolt securing methods were unsuitable as they allow loss of clamp load under service conditions. The materials used, salt water environment and strict qualification testing also ruled out other methods. Nord-Lock was able to provide the company with testing of its joint design using our facility in Sweden. The tests proved the integrity of the design prior to building the three qualification units and minimized the risk of failure during the customers own rigorous testing. This process minimized the customer's financial exposure and reduced the time taken to bring the new design to market.

Graham Souter, Managing Director of Nord-Lock Ltd says: "NORD-LOCK has an enviable record of providing a safe and secure bolting solution where compromise is not an option. We work with major industry players all around the world to improve safety, reduce equipment failure and keep maintenance requirements to a minimum."

DNV approves NORD-LOCK for preloaded bolted assemblies subjected to dynamic, fatigue impact and vibration induced loading, Cert No D-3029.

Washers are available in steel with zinc flake DELTA PROTEKT coating for bolts from M3 to M130 and in A4 stainless steel from M3 up to M80. SMO, Inconel and Hastelloy washers are also available for particularly aggressive environments.

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Safety first

Tom Shelley reports on some of the cutting edge developments in the oil and gas sector.

The oil and gas industry requires the use of technologies that are peculiar to its needs: reducing the risk of fires and explosions from inflammable gases as much as possible; resisting corrosion and the pounding of wind and waves; and, at the same time, keeping costs down.

While the basic technologies do not change much, there are always new tools coming along with the potential to assist production and reduce costs, and a need to extract oil and gas from ever more difficult locations.

Peter MacAulay, managing director of Expo Technologies, said his company has been making electrical enclosures that are continually purged with air to keep out inflammable gases for more than 25 years. However, there are always new technologies that these enclosures have to accommodate and he made particular mention of 'optical technologies' such as lasers and high-intensity lamps, mainly for analytical purposes. But the enclosures could also house welding and cutting systems, in which case they could bring the same benefits to the oil and gas industries as they have on land – much greater speed and precision. In such cases, Macaulay says, the task is to ensure that the amount of light that gets out is 'within certain limits'.

The cabinets are purged with compressed air. Macaulay explained that the need arises because, even if the enclosures are sealed, flammable gases are liable to be sucked in during fluctuations in atmospheric pressure. If this happens, the gasesc tend to accumulate in the bases of the cabinets. Housings therefore need to be flushed out downwards before power is turned on, and gases kept out by maintaining a small positive pressure relative to the atmosphere outside.

This approach does not require the use of nitrogen or gas from bottles. According to Macauley, flammable gases are normally removed from the compressed air supplies used in oil and gas installations using water traps.

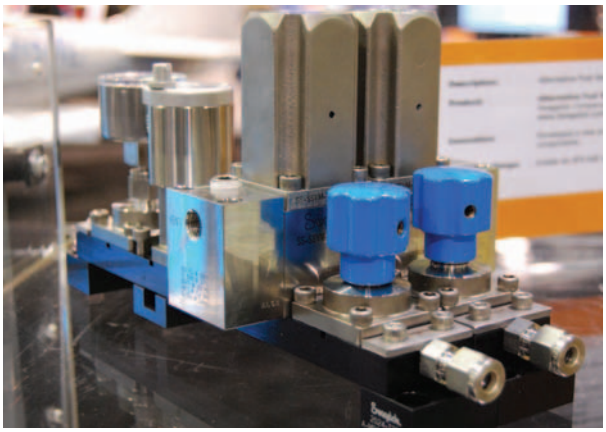
The only alternative to purged cabinets is to house anything electrical in cast steel or plastic enclosures strong enough to withstand an explosion within them. While this is the preferred route for small enclosures, it is prohibitively expensive for large ones.

Reliable and high-quality welding leading to more reliable and cost-effective constructions are also critical requirements for the offshore industry and these are the goals of the European Union MintWeld project. Led by the University of Leicester, 11 European collaborators aim to understand welding processes better over a wide range of scales, using computer modelling that incorporates knowledge based from both laboratory and industrial experiments.

According to consortium leader Dr Hong Dong: "The project is highly valuable, given the potential catastrophic consequences a disaster would create, as exhibited in the 1980 *Alexander Kielland* wreck, in which 123 people lost their lives due to a faulty 6mm weld.

"Failures in welded components, such as deep sea oil and gas transport systems, can result in lost production valued at several billion Euros, whilst exposing the EU to increased petroleum prices and increasing dependency on oil and gas supplied from other regions. This project will deliver an accurate, predictive and cost-effective modelling tool that will find widespread application in the relevant European metals industry."

Another of the participants is TWI, which has particular knowledge of the



Swagelok has brought out a new family of valves for instrumentation and sampling.

subject through its Engineering Critical Assessment (ECA) work. Speaking to a meeting of the Chartered Quality Institute, Dr Isabel Hadley, manager of TWI's Integrity Section, explained that ECA was developed during the 1970s North Sea oil boom to address the problem of 'what happens if you find cracks during the last stages of manufacture or during service?'.

Assessment can either be based on design rules and Charpy impact energy test results, or Failure Assessment Diagrams (FADs). The latter assumes cracks will be present, but will not grow as long as they are inside a curve that relates:

$$Kr\ (fracture\ ratio) = \frac{Applied\ stress\ intensity\ factor}{Material\ toughness}$$

and

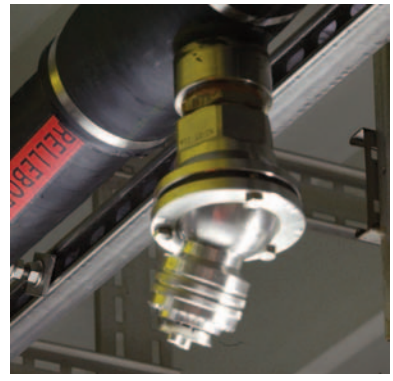
$$Lr\ (load\ ratio) = \frac{Reference\ stress}{0.2\%\ proof\ stress}$$

The trend now is to base such curves on full fracture mechanics analysis, resulting in more cost effective designs, longer use of existing structures and increased reliability and safety.

There is, as might be expected, a raft of standards to follow, including BS EN 7910, a Guide to methods for assessing the acceptability of flaws in metallic structures, and API 579-1/ ASME FFS-1 2007 Fitness For Service. The latter is mainly concerned with deciding whether existing structures can be kept in service and, if not, what should best be done with them.

Dr Hadley said that, in the future, she expected to see: "Improved precision and the ability to predict the exact point of failure and margin for safety." The problem, she said, is that in order to do so, engineers need to have 'extremely detailed input data, including all likely residual stresses from welding'.

Extremes of temperature are a significant factor in oil and gas applications. Trelleborg Offshore has recently secured a contract to supply Elastopipe, its synthetic rubber-based, fire-resistant, flexible piping system for nitrogen transport in extreme temperatures, at the Sakhalin Energy Investment Company's Onshore Processing Facility (OPF). Situated in



the Sea of Okhotsk which is typically ice-bound for up to six months a year, operations are hampered by severe cold, snow, ice, ice floes and storms.

The advantages of Elastopipe over conventional rigid steel pipes have already made it an established solution for seawater-based deluge and sprinkler systems, due to its corrosion-free and fire resistant performance.

The requirement was to qualify for -45˚C exterior temperatures for nitrogen gas transport around the OPF, but the challenge was to prove that Elastopipe and its couplings were gas tight, even at -45˚C. Testing, which demonstrated to the client that the standard Elastopipe and standard couplings could meet the requirements, was performed and accredited by the Norwegian Teknisk Institutt. The tests showed that flexibility, lightweight, corrosion-free and ease of installation without the risk of welding are valuable, especially under extreme conditions.

Another big cause of failures, particularly offshore, is corrosion. Cadmium plating is off limits for most onshore applications, but nobody seems to have found a satisfactory replacement for it offshore. Cadmium electroplated coatings offer a unique range of properties for which no single alternative exists.

Along with the National Centre of Tribology, leading academic bodies and aerospace contractors, Poeton was a member of the DTI-sponsored RECAP project, set up to seek substitutes for cadmium electroplating. This found that, while 'careful evaluation of applications can often permit use of other coatings … this is very selective and depends much on the priority property for which cadmium electroplating became the original selection'.

However, there are now alternatives. Chambrelan, for example, has developed a chrome-free, white zinc plating process for its telescopic slides that offers 480hr of protection against the salt spray test before the appearance of white, rust, while improving the protection against red rust from 600hr to 672hr. For valves for offshore use, Fisher specifies zinc-rich primer, polyamide epoxy tie coat and polyurethane top coat.

Meanwhile, Swagelok has brought out a new family of valves for instrumentation and sampling applications in the oil and gas industry. The design challenge was to develop a modular approach that would give increased functionality in smaller footprints, using both pneumatic and manual actuation.

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READER INTERVIEW

IAIN CHISHOLM
DEVELOPMENT ENGINEER
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60 SECOND

Q How did you get into the engineering industry?

A I started engineering when I was 16. I came out of school and into an engineering technical apprenticeship. From there, I did all the training I needed – City & Guilds, NVQs; HNC; HND – all sponsored by the company I was with at the time, a company called Benfords, which is now owned by Terex. That was making dumper trucks and tarmac rolling machines, which is where I started off my life in engineering.

Q How did you find yourself in your current position?

A Having worked in all the various departments at Terex, I ended up working in development engineering. And that was mainly doing the hydraulics on the dumper trucks and tarmac rolling machines. I then made a move to Eaton Hydraulics and worked as a development engineer doing mobile hydraulics. My experience working there and in the mobile sector got me the job in Moog Controls, where I've been for five years.

Q What does your role with Moog Controls involve on a day-to-day basis?

A I work as an applications engineer, so on a daily basis, I'm dealing with customer enquiries, service issue, problems with machines. We also do programming on control systems. A lot of my day-to-day work is concerned with the Wimbledon roof – doing the servicing on there and looking after it during the championships.

Q Apart from the Wimbledon roof, what are some of the more interesting projects you've worked on?

A I did work in motorsport hydraulics for a while, which I enjoyed for about a year and a half. I was working with Ferrari on power steering valves, doing release valves for Cosworth Racing. So I was working closely with the teams and doing development work.

A while ago, I was also involved in a commissioning system in China. It was a readout system for a water turbine. The major challenges of that was that I was in the middle of nowhere in China and we were dealing with a Chinese customer, only a few of whom spoke English. So we were trying to commission a heavy industrial system in the middle of nowhere eating with chopsticks for three weeks. I was there so long, I almost forgot how to use a knife and fork!

Q What have the main challenges been in working on the roof at Centre Court?

A The main challenge with the Wimbledon roof project was that it was such a big installation for Moog and there's a lot of equipment on the roof that has to interact with other equipment from other companies, which was a big challenge. And then there's the mechanical actuation system, which has to deal with the mechanical side of the roof. So trying to get everything together was a big challenge.

Q Has the industry changed much since you joined?

A I think the big step forward since I started has been the development in CADCAM, computer systems and control systems – being able to program from your laptop. Communications have changed completely, Moog is a very large company and has to deal with engineers all round the world all the time. Obviously, the internet allows us to do that now.

There's also now a big emphasis on doing all the planning up front; when I started in engineering, it was just 'go and do the job and if it goes wrong, we'll work it out later'. Now, it's completely different.

Q What are the big issues facing the industry?

A I think the biggest issue at the moment is getting young people. There are apprenticeships around, which I still think are the best way to get into engineering, but you don't really see enough of them. It's so important to get new blood in. There's a perception that engineering's a dirty industry and it couldn't be further from the truth.

Q How do you see the industry going forward?

A I think the biggest problem we've got is the decline of the manufacturing base. However, the UK is still a really good place for research and development. We take really big steps forward in that area and, using our expertise there, we can outsource. I have a feeling that over the next few years, a lot of manufacturing is going to come back into the UK as it gets more and more expensive to outsource abroad.

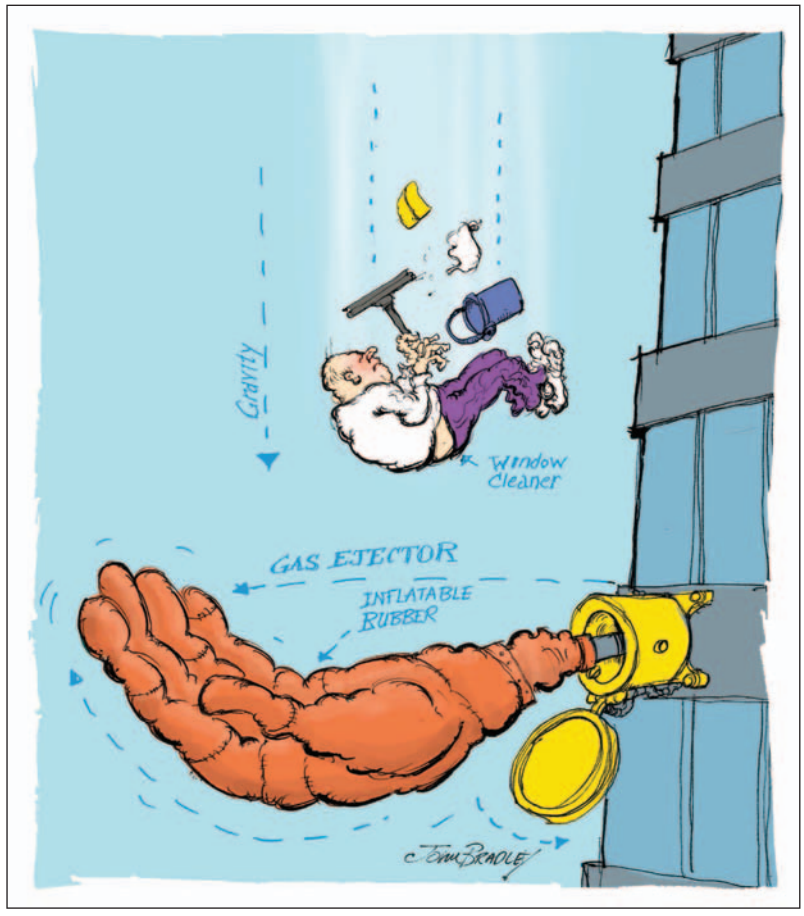
Got an interesting project? To be considered as a future 60-second interview candidate contact: pfanning@findlay.co.uk

Softening the drop

Falls from height are a major safety concern in many sectors, but how can fall arrest systems be made safer?

If somebody is working on a high building these days, they will be equipped with a safety harness and a lanyard attached to a steel cable attached to the roof. However, if the user falls, they are going to apply a massive shock load to this cable. If the cable is very rigidly attached to the roof, the user will suffer a massive shock when the lanyard is fully extended, while the cable mountings will additionally apply a massive shock loading to the roof. This can be mitigated if the mountings are designed to absorb the shock.

Shock absorbers in compression are commonplace, but shock absorbers in tension are less so. Mountain climbers use ropes that stretch under shock loads, but safety lanyards do not do this. If the cable attachments are very firmly attached to a roof, the shock is liable to be absorbed either by some of the mountings pulling out, or the roof distorting. This, as well as being unsafe, is likely to be expensive to repair.



The Challenge

What is needed, then, is a linear shock absorber that is able to absorb the force exerted by, say, up to three people falling, without either hurting the falling workers or the roof. It thus needs to bring them to a stop in a reasonable distance, and exert no more than 10kN on either people or roof. If the maximum load is 300kg, this requires that the falling person or persons be brought to a halt in a few hundred mm. The other requirements are that the device should be compact, inexpensive, and being a piece of safety equipment, totally reliable, even if left without maintenance for years.

These requirements rule out pieces of machinery with centrifugal clutches and rubbing surfaces. Such devices are inevitably going to be relatively complex and expensive, but most importantly, are unlikely to work when left unlubricated for a period of years.

A solution involving springs is possible, but they are going to have to be big. Anchoring workers to cables with bungee is also possible, but bungee and climbing ropes require care in storage, and constant inspection to ensure they are still good.

There is however, an excellent alternative, based on sound mechanical engineering principles, developed and manufactured by a British company that fulfils all requirements. It has been thoroughly tested, and is in service on a number of prestigious buildings. Once you see it, you may consider it obvious. See if you can come up with anything better. The solution will be fully described in the next edition of *Eureka*.

The answer to last month's Coffee Time Challenge, how to cope with subsidence, is in our Technology Briefs section on page 9

3D Printing

New Hewlett Packard 3D printers available from Laser Lines Ltd

With many years experience selling the full range of Stratasys 3D Printing and Rapid Prototyping Systems, Laser Lines are now able to add HP Designjet 3D Printers to their portfolio.

Laser Lines have become a Hewlett Packard Preferred Partner so they can offer the HP Designjet 3D and the HP Designjet 3D Colour to complement their existing products, covering a range from an easy to use desktop 3D printer up to a large additive manufacturing centre capable of building parts almost a metre square in a wide range of materials. The HP Designjet 3D offers a totally automated solution for producing models in an office environment.

@: markt@laserlines.co.uk
✆: 01295 672500

www.laserlines.co.uk

Adhesives

Adhesives Become More User Friendly

Loctite 2400 and Loctite 2700 are two new threadlocking adhesives that meet stringent Health and Safety requirements. Both medium-strength Loctite 2400 and high-strength Loctite 2700 have qualified for a "white" Material Safety Data Sheet. This means according to the tough EC Regulations neither adhesive carries hazard symbols, risk or safety phrases. Also, they do not contain any declarable carcinogenic, mutagenic and reproductive toxins. While breaking new ground, the traditional high performance of Loctite brand threadlockers has not been compromised.

Once cured, both products offer excellent resistance against most industrial chemicals, and achieve good thermal resistance.

@: technicalservice.loctite@uk.henkel.com
✆: 01442 278100

www.loctitesolutions.com

Adhesive Tapes

For help and technical advice on our range of double sided, cloth and masking tapes or converted products please phone 01908 500235 for your nearest authorised tesa distributor

tesa AG
A Beiersdorf Company

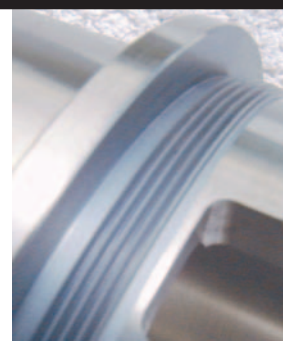
tesa UK Ltd
Yeomans Drive Blakelands Milton Keynes MK14 5LS
tel: 01908 500235

think tesa

www.tesa.co.uk

Coatings

WS2 Stops galling of SS and Titanium



Stainless Steels and Titanium are both prone to galling and seizing. WS2 is a very low friction dry lubricant surface treatment, developed by NASA for use in deep space. It has been shown to provide a very cost effective solution, preventing both problems on threads and other sliding surfaces.

WS2 works well from -273° to 450° C and down to 10-14 Torr. WS2 has been applied to bearings and gears to extend life.

Design Out maintenance problems with WS2!

@: sales@ws2.co.uk
✆: 01430 861222

www.ws2.co.uk

Compact Absolute Linear Encoder

Sick Ultra Compact Linear Encoder Delivers High Accuracy

SICK (UK) has launched the TTK70, a highly compact absolute linear encoder, designed for positioning robotics and machine tools or as a motor feedback system for linear motors. This unique, high-performance magnetic encoder provides a reliable alternative to fragile optical scales, with sub-micron resolution and an accuracy of +/- 10 microns. Featuring a small yet robust read head, barely bigger than a match box, the TTK70 encoder is not only incredibly compact but also easy-to-install, and is ideal for applications with limited space. The TTK70 encoder is highly flexible with a wide range of interface options, including SSI/SinCos, Profibus, DeviceNet and CANopen, enabling simple integration into PLC-based installations. The TTK70 is also available with Hiperface® interface, enabling it to deliver highly dynamic linear motor feedback.

@: Andrea.hornby@sick.co.uk
✆: 01727 831121

www.sick.co.uk

Differential Pressure Transmitter

Differential Pressure Transmitter DPT-10 from WIKA

A new, cost-effective solution for a wide range of applications encompassing differential pressure, level and flow measurements.

This new development, stands out through its simple on-site operation - especially for users unfamiliar with it – and also through its ability to fit optimally in a range of installation situations. The DPT-10 is available with a case in a single or a double chamber design.

The optional display and control module can therefore be fitted on the top or on the side, depending upon the installation conditions. A choice of plastic, aluminium or electropolished or cast stainless steel is available for case materials. For explosion protection there are either "intrinsically safe" or flameproof case variants available.

@: info@wika.co.uk
✆: 01737 644008

www.wika.co.uk

Electric Atomisers

Fine Droplets without High Pressure

The small electric rotary atomiser produced by Newland Design is an efficient way of creating small, consistently-sized droplets by means of high-speed rotation alone, without need of compressed air or any high pressure.

The Newland Atomiser rotates a small porous plastic cylinder at speeds up to 35,000 rpm and emits droplets of less than 40 micrometres in diameter.

Applications include:

- Humidification and Evaporative cooling
- Gas scrubbing and Odour control
- Dust suppression
- Oil misting.

Flow rates up to 25 litres per hour. Power input 24 Volts DC, consumption less than 40 Watts. Evaluation units always available.

@: newland.design@btconnect.com
✆: 01524 733 424

www.newlanddesign.com

Engineering Expertise

Record-breaking steam car owes success to UK engineering expertise

The team that broke the world land speed record for a steam-powered car is visiting Spirax Sarco in Cheltenham as part of its UK tour. As well as being one of the team's main sponsors, Spirax Sarco played a key role in the success by providing expert engineering advice and high performance valves. Spirax Sarco was involved with the project from its earliest stages, providing control valves and positioners for steam turbine and boiler prototype testing. These tests revealed that the boiler design had a power output too low to enable the car to reach record-breaking speeds. Spirax Sarco identified the problem as insufficient heat transfer area within the boiler and helped to redesign the units. The car itself was fitted with two control valve and positioner sets, one for controlled venting of steam during boiler start up, and the second to control the flow of superheated steam to the turbine – in effect acting as the car's 'accelerator'.

@: Sharon.Graves@uk.SpiraxSarco.com
✆: 01242 521361

www.SpiraxSarco.com/uk

Flowmeters

Titan's Breakthrough in Small Bore Flow Metering

Titan Enterprises breakthrough product is now available from £464 EXC VAT!

The new 'Atrato' is a direct and accurate through meter without a contorted flow path which can operate over very wide flow ranges. The ultrasonic technology used offers excellent turndown, linearity and repeatability.

The Atrato is capable of monitoring flow over a range of 200:1 and has accuracy better than ±1.5%. Its simple, yet effective design makes it applicable to a variety of markets, whilst its USB interface makes it extremely easy to install and use.

@: sales@flowmeters.co.uk
✆: 01935 812790

www.flowmeters.co.uk

Force Tester

Just Touching The Surface... Using A Force Tester

A Korean based company is using a Mecmesin force test system to establish consistent manufacture and touch uniformity for its navigation device touch screens. A MultiTest 1-i, rated to 1000N, combined with a 5N load cell, adjustable X-Y table and compression probes enables the Korean H Company to test various points of the touch screen at different force levels to establish reliable operation of the product. The X-Y table provides added versatility offering users fine precision alignment of the touch screen beneath the compression probe, so that multiple points can be tested in quick succession with minimal set-up time required. Using Mecmesin's computer-controlled test system provided Korean H Company with use of its software's 'event input' facility. Emperor™ software monitors when a switch is activated during the test, thereby providing reliable data regarding the actuation forces involved.

@: sales@mecmesin.com
✆: +44 (0) 1403 799979

www.mecmesin.com

Hinge Pins

Spirol Introduces High-Performance Hinge Pins for PC Board Card Locks and Ejector Clips

Spirol Industries has introduced a new high performance hinge pin specifically designed for PC board card locks and ejector clips. This new Series 880 Coiled Spring Pin has the ideal combination of strength and flexibility to enable manufacturers and assemblers of PC board card locks and ejector clips to maximize hinge performance and minimize costs. The quality of the hinge is unsurpassed by any other fastening method due to the low insertion force and compression of the pin during and after installation. The pin's uniform radial spring force results in a controlled hinge movement that remains consistent throughout the life of the assembly. Manufactured from corrosion resistant austenitic stainless steel with an oil free finish, the Series 880 Coiled Spring Pin is compatible with any type of plastic handle. Its construction makes it suitable for manual or automatic installation and after insertion it retains itself without any need for any secondary operations.

@: uksales@spirol.com
✆: +44 (0) 1536 444800

www.spirol.com

Instrumentation

Ixthus Instrumentation

Non-Contact Position Measurement using inductive, capacitive, ultrasonic, fibre optic or laser technologies. Measurement ranges from 50µm to 500 metres, resolution to 0.01 nanometre, frequency response to 200KHz, all with excellent environmental protection.

Force and Torque Measurement, miniature and fatigue rated loadcells, strain gauged bolts and clevis pins. Custom designs to meet your exacting requirements. Vibration Monitoring with switches, sensors and instrumentation for power generation and offshore applications. Ixthus provide full technical support for design, installation and calibration to all areas of industry for R&D testing, quality control and production requirements.

@: john@ixthus.co.uk
✆: 01327 353437

www.ixthus.co.uk

Modular Cable Gland Plates

New Modular Cable Gland Plates offer advanced versatility

Cable management and fastener distributor Anixter Component Solutions has launched a new range of Modular Gland Plates offering advanced versatility when sealing multiple cables. The Modular Gland Plate is a versatile flange system with sealing inserts that can be changed depending on your needs. You are no longer forced to use fixed flanges with a certain number of predetermined openings. You can now decide for yourself what size openings and how many you want in your flange. You are also free to choose what level of protection you want to have. You choose the inserts that suits your needs! The Modular Gland Plate is very compact in its design and very easy to install. Just put the inserts together, place them in the frame and install. The inserts lock on to each other as well as to the frame, ensuring a safe and secure installation.

@: sales@anixtercomponents.com
✆: 01202 865222

www.anixtercomponents.com

Patent Services

J A BOUTLAND, C Eng, F.I.Mar.E

Chartered Patent Attorney, European Patent Attorney, Registered Trade Mark Agent

8 Heatherstone Avenue, Dibden Purlieu, Southampton, SO45 4LQ

Tel: 023 8084 3749 Fax: 023 8084 3105

✆: 023 8084 3749

Sensors

Sensors for Research and Development

Pressure, vibration, position, force, strain and torque.

StrainSense are expanding the ranges of sensors on offer to the aerospace, military, power, automotive and rail industries. Many other industries are catered for and OEM requirements are increasingly being met.

New additions :-

Linear position sensors for harsh environments, including miniature designs. Servo accelerometers for navigational systems. Shock resistant accelerometers for autosport applications. StrainSense offer standard and custom designs of most of the sensor types listed.

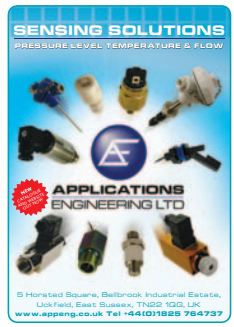
Stock is now held of many ranges.

@: sales@strainsense.co.uk
✆: 01908 543038

www.strainsense.co.uk

Sensors/Switches

Pressure level temperature and flow



Applications Engineering Ltd holds a comprehensive range of pressure, vacuum, level and flow switches. We provide 'tailor made', custom designed products, accessories and associated product lines including the Jetcleaner hose and pipe cleaning system.

We offer a 30 day sale or return sample service on our standard products. That way, you only buy when you are satisfied that the product suits your application.

More often than not, we are able to get a product to you within 24 hours of you making your first enquiry.

@: info@appeng.co.uk
✆: 01825 764737

www.appeng.co.uk

Sensor Technology

New and Innovative Sensor Technology Offers Unmatched Sensitivity for Differential Low Pressure Measurement

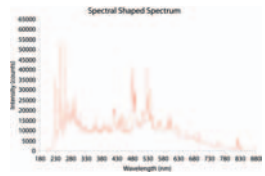
Sensortechnics' new LBA series offers differential low pressure measurement with ranges of 250 and 500 Pa Full Scale. The LBA sensors perform fully analog on-chip CMOS signal conditioning to allow for linear and temperature compensated outputs with high differential pressure resolution of typ. 0.1 % and fast response times of typ. 1 ms. The LBA sensors feature superior sensitivity and offset stability. The devices are based on thermal flow measurement of gas through a micro-flow channel integrated within the sensor chip. This very narrow channel decreases the flow through the LBA sensor by several magnitudes compared to other flow-based pressure sensors. The extremely low gas flow ensures high immunity to dust contamination and condensation. The highly sensitive sensors are ideal to detect very small pressure differences in many medical respiratory devices as well as industrial HVAC applications.

@: uk@sensortechnics.com
✆: 01788 560426

www.sensortechnics.com/lba

Spectral Shaping Technology

Ocean Optics Announces Advanced Spectral Shaping Technology



Signal-balancing technique is scaleable to large-volume spectrometer.

Ocean Optics (www.OceanOptics.eu), the industry leader in miniature photonics, has developed a proprietary light shaping technique for its spectrometers that balances and smoothes the uneven spectral emission from UV-Vis light sources used for spectroscopy applications. As a result, users can measure light more evenly across a broader spectral region and thus improve signal-to-noise performance. The technique is especially useful for spectral absorbance applications where strong absorbing bands coexist with bands of low signal in the unbalanced spectrum. This low signal level limits the maximum measurable optical density.

@: info@oceanoptics.eu
✆: +31 (0)26 319 05 00

www.oceanoptics.eu

Synrad Lasers

Laser Marking Painted Stainless Steel Bottles

Laser Lines offers the complete range of Synrad lasers; one of their recent applications was to produce a complex company logo on black-painted stainless steel water bottles.

Stainless steel water bottles are growing in popularity due to environmental and health concerns about certain chemicals in plastic bottles.

A 25W Synrad laser was used to ablate the black paint on the bottles, the resulting mark exposed the stainless steel underneath to create a high-contrast, shiny mark that was completed in a cycle time of 7.56 seconds per bottle.

@: garyb@laserlines.co.uk
✆: 01295 672500

www.laserlines.co.uk

Temperature Sensors

Raytek® introduces MI3 Series of miniature infrared temperature sensors including the world's smallest stand-alone pyrometer

Versatile, high-performance IR thermometers offer lowest installation cost per measurement point.

Raytek®, a leading worldwide provider of infrared (IR) thermometry, has introduced the MI3 Series of infrared temperature measurement sensors. The MI3 Series represents a new generation of performance and innovation in noncontact temperature monitoring for Original Equipment Manufacturer (OEM) applications and manufacturing processes. The MI3, a rugged, IP 65 stainless steel miniature pyrometer with integrated electronics, is the smallest fully functional, stand-alone infrared temperature sensor for fixed installation on the market today.

@: ukinfo@raytek.com
✆: 01908 370000

www.raytek.com

cube67+ – THE PLUS FOR ADDED FLEXIBILITY

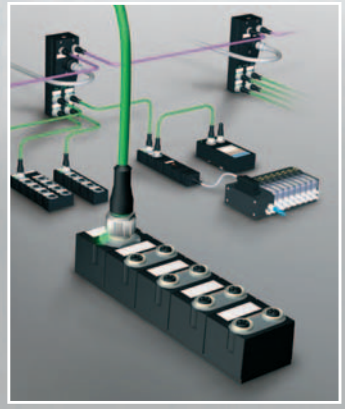
The next generation

The innovative multi-protocol fieldbus system from Murrelektronik, which has radically simplified and modernized decentralized installation has taken a step further with a plus.

The single bus node can support up to 20 I/O modules in a 30m circumference and with a reduced number of cables. The range of I/O modules continues to grow and includes digital and analogue ports, safe outputs, logic, counter, valve island, temperature, I/O link etc. Both IP67 or IP20 are available.

Cube67+ : a truly flexible system.

- **More options**
- **More flexibility**
- **More distance**
- **More performance**



Cube67 – the modular bus system

PROFINET · PROFIBUS · CANopen · EtherNet/IP · DeviceNet

Murrelektronik Ltd
5 Albion St, Pendlebury Ind.Estate,
Swinton, Manchester, GB
M27 4FG

Phone 0161 728 3133
www.murrelektronik.co.uk
sales@murrelektronik.co.uk

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