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The Gold Standard

The Skills Show shows the UK's young engineers at their best

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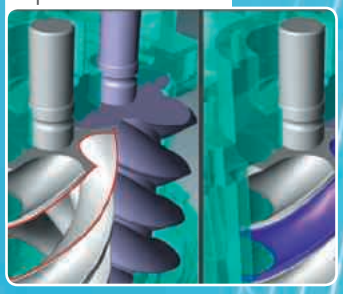
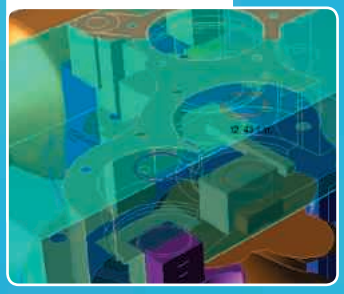


Interoperability software

High speed file translation

File Repair



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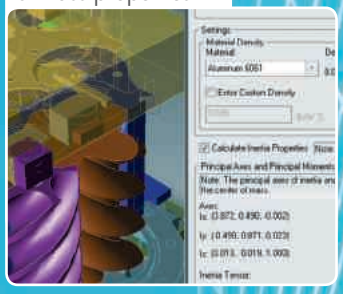
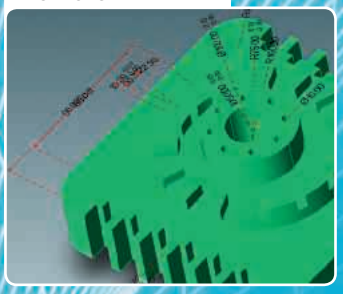
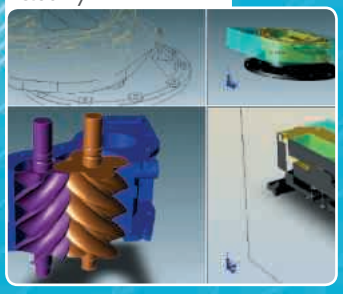


Product Manufacturing Information

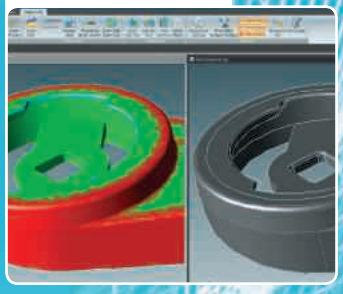


High Translation Quality

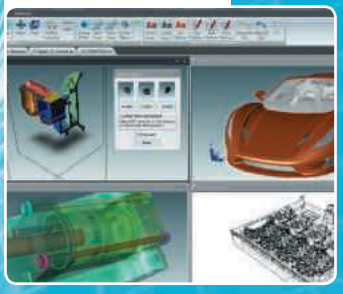


Close geometry into solid models

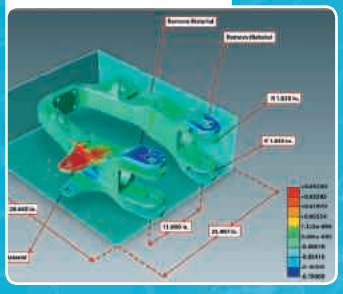
File comparison & validation



Scalable product line



Report generation



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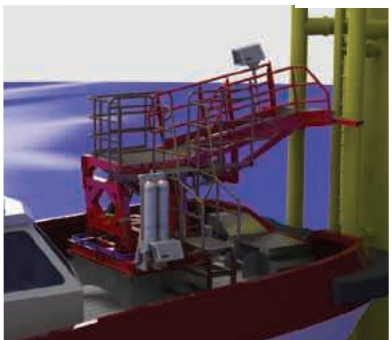
CONTENTS

Volume 32 Number 12 December 2012

14

18

24



43

14 Cover Story: Skills Show sets the Gold Standard
Taking place between 15th and 17th November, the Skills Show 2012 was a remarkable showcase for the UK's young engineers. Paul Fanning reports.

18 Interview: Professor Dame Ann Dowling
Laura Hopperton talks to the head of one of the largest and most prestigious engineering departments in the UK about the challenges currently facing the industry and what is being done to solve them.

21 Spectroscopy offers answer to liquids ban
A screening solution devised by a British company could help facilitate the easing of the ban on taking liquids onto aeroplanes. Paul Fanning reports.

22 Sensing presence without motion
A sensor capable of detecting human presence without movement offers a range of possibilities. Paul Fanning reports.

24 Simulation software offers solutions
Simulation and analysis offer benefits to designers in diverse industries. Paul Fanning looks at some examples.

29 VIEW FROM THE TOP
Eureka's annual feature canvassing the views of some of the leading players in the UK engineering and manufacturing sectors industry.

40 SPS Show drives innovation
The 2012 SPS/IPC Drives Show took place in Nuremburg in late November. Here, Paul Fanning looks at some of the new technologies to have emerged from it.

43 Hydraulic system calms rough seas
A safer means of transferring maintenance staff from workboats and offshore wind turbines deploys complex hydraulics. Paul Fanning reports.

45 Hydraulics meet exacting demands
Hydraulic systems are well-suited to demanding applications and environments. Here, Paul Fanning looks at some of the components that make this possible

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5 Comment
Applauding those medalling kids

7 News
Air-breathing rocket engine passes milestone tests

3D camera helps wound assessment in Afghanistan

New investment for SME clusters

Engineers pave way to 3D printed personal electronics

Firm raises £2.5m to target EV market

11 Technology briefs
Geared motors give precise speed holding

Tapes assist wind energy industry

ETP sensor range covers all bases

Complete freedom in 2D bearing track design

47 IP Advice
In this issue, *Eureka* and D Young & Co LLP look back at the issues raised in 2012.

50 Coffee Time Challenge
This month's challenge is to come up with a means to help those suffering from tremors to drink more easily.

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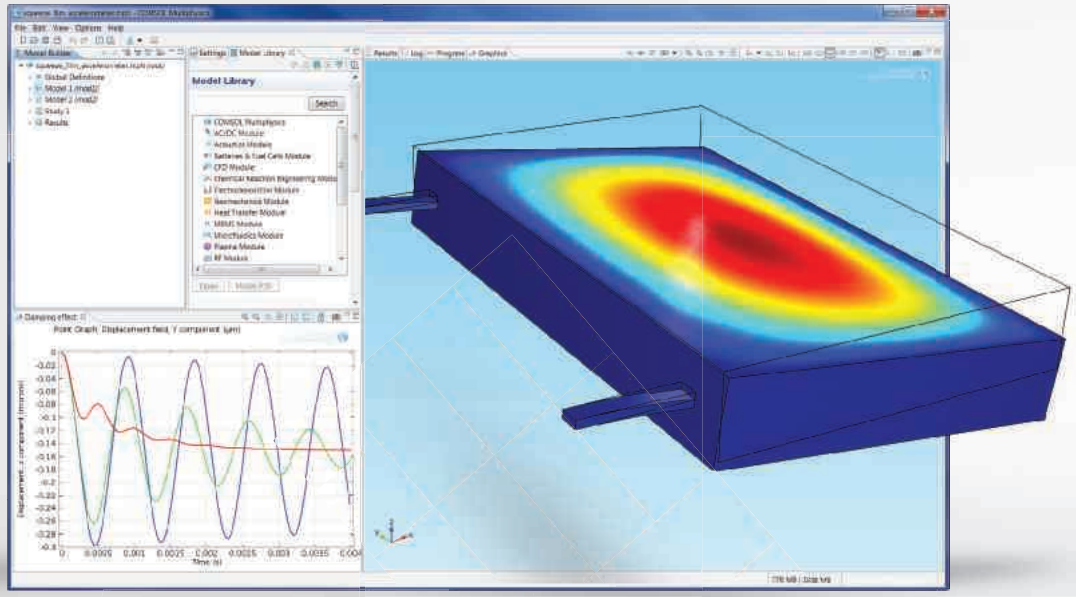
SENSORS: Squeezed-film gas damping is a critical aspect of many MEMS accelerometers, where inertia produces a motion that the device detects. The narrow gap restricts flow, which causes gas pressure to increase, and decelerates the plate's movement.



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Applauding those medalling kids

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

Attending the Skills Show in November at the NEC proved a genuinely upflifting experience. To see so many young people excited about engineering and technology was truly inspiring.

Of course for some of the attendees, the source of that excitement may have had as much to do with a day away from the classroom and the prospect of getting their hands on freebies as with the technology or the prospect of a career. Even so, only a hardened cynic would have been able to resist a smile at the sight of so much youthful enthusiasm – let alone question whether or not it was genuine.

While this aspect of the Show was pleasing, more pleasing still was the way in which the competitors in the WorldSkills competition were throwing themselves into their respective contests. Perhaps more important, though, was the fact that they were being recognised, applauded and rewarded for skills acquired in many cases from vocational education.

Speaking at the opening ceremony, Business Secretary Vince Cable had already made clear the enthusiasm with which both he and the Government as a whole regard vocational education, saying: "I want to see a world where it isn't just the 40% of young people who go to university that we celebrate, but the others who are acquiring vocational skills and training which is every bit as valuable – if not more so."

Comments like this and competitions like WorldSkills are to be applauded, aiding as they do in boosting the esteem with which skills such as those demonstrated by the young engineers taking part in WorldSkills are held. And while the award of a medal for engineering skills may seem a small thing to some, the positive effect it could have on the engineer, his or her peers and engineering as a whole is potentially vast.

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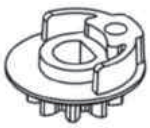

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3D camera helps wound assessment in Afghanistan

A portable 3D imaging camera developed by an Oxford-based medical technology company is being used in Afghanistan to assess the nature of wounds received by soldiers.

The Eykona camera – shortlisted for Electronic Product of the Year in the 2011 British Engineering Excellence Awards – creates a detailed 3D model of any wound or scar, from which accurate measurements of distance, area, colour, width or volume can be made.

This model can then be assessed from all angles using rendering software and shared with other doctors and clinicians. Small sterile 'targets' allow the focus and position of the camera to be set, eliminating inconsistency between images.

Using the models created using the camera, medics can assess fresh wounds and understand if and how the wound is healing, allowing them to adjust the treatment plan accordingly.

Lt Col Steve Jeffery, a consultant plastic surgeon at the Queen Elizabeth Hospital Birmingham, said: "It is often difficult to judge the size of a wound and gain an understanding of if it is healing over time. The Eykona System allows multiple objective measurements of these wounds to be carried out to track the healing progress.

It was recently evaluated at the British Military Field Hospital in Camp Bastion, Afghanistan. The Eykona System proved useful in Bastion to show medical team members who were not present in the operating theatre what casualties wounds looked like before we applied dressings."

Air-breathing rocket engine passes milestone tests

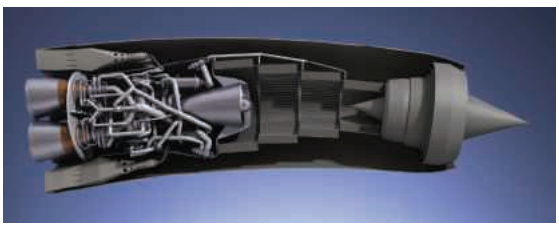
In what has been described as the biggest breakthrough in aerospace propulsion technology since the invention of the jet engine, Oxfordshire-based firm Reaction Engines has announced the successful testing of its air-breathing SABRE rocket engine.

Utilising both jet turbine and rocket technology, the engine's pre-cooler technology is designed to cool the incoming airstream from more than 1,000°C to -150°C in less than 1/100th of a second without blocking with frost. The recent tests, carried out by the European Space Agency, have proven the cooling technology to be frost-free at the crucial low temperature of -150°C.

Minister for Universities and Science David Willetts said: "This is a remarkable achievement for a remarkable company. Reaction Engines has shown the world that Britain remains at the forefront of technological innovation and can get ahead in the global race. This technology could revolutionise the future of air and space travel."

Reaction Engines' founder Alan Bond, who has led the research from the start, added: "These successful tests represent a fundamental breakthrough in propulsion technology. Our lightweight heat exchangers are going to force a radical re-think of the design of the underlying thermodynamic cycles of aerospace engines."

Phillipa Oldham, head of transport and manufacturing at the Institution of Mechanical Engineers, said the breakthrough would have a great impact on the UK aerospace engine industry, with the potential to improve fuel efficiency by up to 10%. She noted: "The fact that this technology is being developed in the UK is also hugely encouraging and demonstrates the talent and expertise there is in this country for manufacturing high value and high-tech goods."



New investment for SME clusters

The Technology Strategy Board will invest up to a further £6 million in new Launchpad competitions in the next six months to accelerate the development of existing clusters of innovative, high-growth SMEs around the UK.

This builds on the success of its £1.25 million investment in London's media and technology hub Tech City in 2011. The competition attracted over 200 applications from SMEs to work in the digital space in Shoreditch, London, gaining an additional £1.5 million of private sector funding towards 13 projects now at various stages of completion.

In a speech to business leaders about the Government's Annual Innovation Report, Business Secretary Vince Cable said: "The Launchpad initiative is an important driver of innovation. The three new competitions will focus on high-tech sectors where Britain already has the competitive advantage and a world-class research base. The investment will help our most innovative SMEs develop new products and services and expand their businesses."

The proposed *Materials and Manufacturing Launchpad* will focus on a cluster of companies around Daresbury and Runcorn Heath; the *Space and Satellite Technology Launchpad* will build on the growing cluster at Harwell, linking to related centres of excellence in the UK, and there will be a series of Launchpads in digital and creative clusters across different parts of the UK.

Iain Gray, chief executive of the Technology Strategy Board said: "This is part of an ongoing programme that will explore cluster support in different areas of the economy where the UK has world-class capabilities and vibrant developing sectors.

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Engineers pave way to 3D printed personal electronics

Researchers in the UK are developing new materials which could one day allow people to print out bespoke personal electronic devices such as games console controllers which perfectly fit their hand shape.

A team from the University of Warwick has created a simple and inexpensive conductive plastic composite that can be used to produce electronic devices using the latest generation of low cost 3D printers.

The material, nicknamed 'carbomorph', enables users to lay down electronic tracks and sensors as part of a 3D printed structure – allowing the printer to create touch sensitive areas for example, which can then be connected to a simple electronic circuit board.

Dr Simon Leigh from the University's Department of Engineering, who led the team, said: "In the long term, this technology could revolutionise the way we produce the world around us, making products such as personal electronics a lot more individualised and unique and in the process reducing electronic waste.

Dr Simon Leigh, University of Warwick Department of Engineering

"Designers could also use it to understand better how people tactilely interact with products by monitoring sensors embedded into objects."

In the short term, Dr Leigh sees the technology having a major impact in the educational sector, allowing the next generation of young engineers to design high-tech devices and products in the classroom.

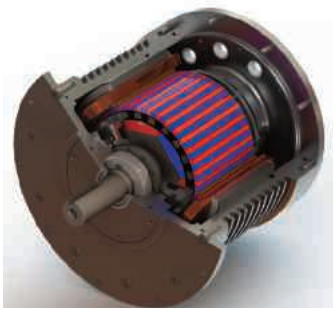
Firm raises £2.5m to target EV market

Sheffield based firm Magnomatics has raised £2.5 million to develop its magnetically-geared motors for the hybrid and electric vehicle market.

Spun out of the University of Sheffield in 2006, Magnomatics creates novel proprietary magnetic transmissions and ultra compact motors and generators for various industries, including renewable energy, automotive, aerospace and defence.

The company's system is said to offer vehicle manufacturers a lighter, quieter, more efficient direct drive motor. The money will also allow Magnomatics to expand its global reach and reputation.

"The investment will not only allow us to grow our team of internationally renowned experts, but will allow us to take our fully proven magnetic transmissions and ultra-efficient motors through to mature product offerings," commented Chris Kirby, Magnomatics' md. "We will also be able to vigorously pursue and progress our international opportunities, ensuring that our ground-breaking technology has real impact in a number of diverse national and international markets".



IP Group invested £1.06m, while Finance Yorkshire provided match funding from its Equity Linked and Fusion IP invested £366,000. The first tranche of funds, totalling £2.25m have been invested and the second tranche of £246,000 is dependent on certain milestones.

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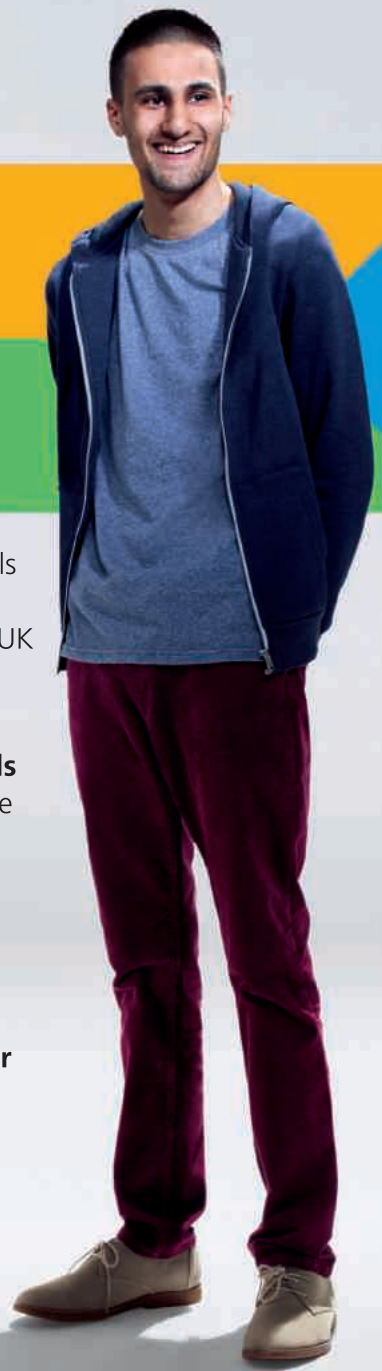

WorldSkills UK helps deliver economic growth and improved levels of skills through competitions, awards and local activities. Many of these activities culminate in showpiece events, such as WorldSkills UK - The Skills Show and National Apprenticeship Week.

WorldSkills UK Competitions feature national and international skills competitions for young people and adults and **drive up levels of expertise** in further education, skills and Apprenticeships. These competitions **reward real talent** among the nation's apprentices and further education students.

There are over 50 competitions across: Built Environment, Engineering, Cultural & Creative Arts, IT & Business Administration and Social & Professional Services.

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Geared motors give precise speed holding

New compact brushless geared motors achieve precise speed holding over a wide range of 1:133. Manufactured by Panasonic, the Minas GV is available at powers of 50, 90 and 130W with gearboxes that give rated output speeds from 1.5 to 1000rpm. The Minas GV geared motors come with compact IP20 drive only 35mm wide for panel mounting. Drives have RS485 and an analogue input plus eight digital set speeds.

Latest Minas technology from Panasonic achieves better than 1% speed holding on motor speeds from 30 to 4000 r/min. Motors are particularly compact, for example: only 65mm long at 130W, and enclosed to IP65 including optional cables. Also they are energy efficient, using typically 20% less power than equivalent AC asynchronous motors.

The compact size and precise speed holding of the Minas GV range suits it ideally for accurate conveying applications such as weighers and inspection machinery. Panasonic Minas GV geared motors are available in the UK from Techdrives.

www.techdrives.co.uk

Complete freedom in 2D bearing track design

While conventional track technology limits track paths to simple combinations of straights and circular curves, the new HepcoMotion PRT2 '1-Trak' allows any conceivable 2D shape to be realised.

The entire track element of HepcoMotion '1-Trak' is manufactured from a single piece of steel, which can include a base plate. Such is its strength and accuracy, it can be used as a key structural element of the machine. The product can be customised with holes, slots and other features eliminating the time and cost involved in designing a separate mounting plate for the track system and supplied mounted to a HepcoMotion MCS frame as the basis for complete automation system.

1-Trak circuits can accommodate much tighter bends than is possible with other systems. This saves space and costs, allowing the manufacturer to optimise production layout.

www.hepcomotion.com

Safety sensors simplify series connection

With its new TR4 Direct safety sensors for doors and gates, Sick has solved the problem of cost-effective series connection of up to 30 switches, achieving PLe, Cat 4 integrity and full diagnostic coverage of an installation. Sick's TR4 Direct safety sensors overcome the problem and enable simple and cost-effective series connection to continue. They ensure reliable monitoring of multiple access installations with full diagnostic coverage of individual faults.

With the new Sick TR4 Direct series, fault finding and trouble shooting is simplified. Each sensor in a chain can indicate a fault, open or closed status and the current sensing range of the device. Each sensor can also indicate the status of the preceding sensor in the chain, which allows quicker identification of an open switch or fault in the system.

The TR4 Direct is easily installed for simple series connection using standard M12 connection cables and M12 T connectors.

www.sick.com

Custom coupling for rocket launcher

A combination of extreme heat, dust and combustion debris proved ruinous for the initial brand of coupling specified for a position sensing system on a truck-mounted missile launcher. The viscous mass that these conditions created resulted in the coupling becoming completely solidified. Repeated failure of the brand was the outcome and Huco Dynatork was asked to propose a solution.

The Hertford-based coupling specialist was ideally suited to the task for two reasons. Many of its products have a proven track-record for reliable operation in extremely aggressive environments. And as a manufacturer of the broadest variety of coupling types on the market, it was able to provide a custom-designed solution that

was optimally suited to the needs of this defence application.

The result was a purpose-made coupling based on the Huco Dynatork standard 19mm diameter stainless steel Multi-Beam. This intrinsically-balanced product has proved itself a highly cost-competitive method of accommodating any combination of axial motion and angular and parallel misalignment. Its compact one-piece construction has no wearing elements to compromise service life.

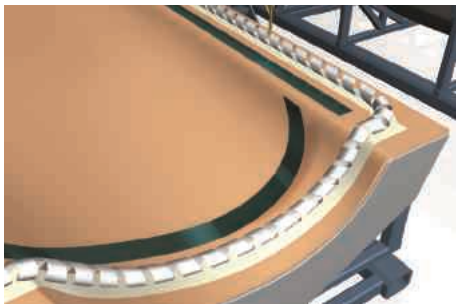
www.huco.com

Tapes assist wind energy industry

RIM (Resin Infusion Moulding) has become established as a key element in the manufacturing of wind turbine blades, with tesa adhesive tapes performing a vital role in the process.

Demands on turbine performance are increasing and, naturally the integrity of the structure is paramount to both efficiency and safety. The RIM processes involving tesa tapes are fundamental to these issues.

RIM relies on vacuum-assisted resin transfer provided through spirals located in the moulds. These are temporarily fixed and removed after processing with tesa 51960 fabric reinforced double sided PP film with a



differential (different adhesive coat weight either side of the carrier) acrylic adhesive. The side with the highest adhesive coat weight bonds to the spiral preventing lift-off during moulding while enabling residue-free removal after processing.

Similarly, resin infusion profiles which speed up preparation process before RIM starts are securely positioned and fixed into the resin distribution net using tesa 4970, a double-sided PVC tape with acrylic adhesive and tesa 4914, a double-sided, non-woven tape, again with differential adhesive. In the production of wind turbine blades the acrylic adhesive is essential as a natural rubber-based adhesive system would contaminate the blade structure and affect its lifecycle performance properties.

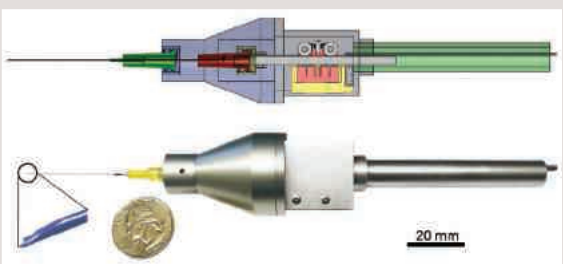
www.tesa.co.uk

Solution to last month's Coffee Time Challenge

The solution to last month's Coffee Time Challenge of how to make injections less painful comes from research work carried out at Johns Hopkins University that has resulted in a device called SMART – smart micromanipulation aided robotic-surgical tool). The device combines an optical coherence tomography imaging technique as a distance sensor with computer-controlled piezoelectric motors to actively stabilise the tip of the tool.

Researchers have been able to integrate a near infrared laser that shines out of the tip of a needle and onto the patient's skin. The laser acts as a distance sensor, measuring the time it take for pulses of light to be received back. By analysing this data via an onboard computer, it can determine when and by how much the tool is wavering in relation to the target tissue.

The information is then fed in to the piezoelectric motor attached to the tip of the needle, which can then actually compensate for these movements by performing tiny actuation. The system can make adjustments at a rate of 500 per second which is far quicker than a typical hand tremor which typically shakes at a rate of 15 per second. The motor has a resolution of about 1nm and the needle has a travel of about 12mm in diameter. The system uses a single fibre optic cable is so small and flexible, the researchers were able to easily integrate it into the front of a tool used for eye surgery. By continually sending and receiving the near-infrared laser beams, the high-speed, fibre-optic sensor precisely measures the motion of the probe. This creates a series of 'station keeping' manoeuvres that compensate for the surgeon's hand tremors.



During the next few years, the researchers hope to take their instrument from the laboratory to the operating suite, and with additional refinements expand its use to other fine-scale surgeries.

www.jhu.edu

ETP sensor range covers all bases

Variohm EuroSensor has released its new ETP range of temperature probes based on a MEAS thermistor. To suit the broadest range of industrial, automotive and scientific applications for precision temperature measurement, four basic packaged design types are available that offer a choice of options.

The four designs conveniently mount the industry standard thermistor in a choice of Ø 4 mm PTFE or Ø 5 mm brass housings, ring terminal probes, or hexagonal head bolts. Within each packaged design, a standard off-the-shelf stock version is available with a 10K3 sensor fitted and the comprehensive list of optional features offered for each type include; housing diameter and length for the cylindrical probes, ring terminal mount diameter/size, and metric thread size for the hexagonal bolt version. The leadwire length for all types is similarly specifiable.

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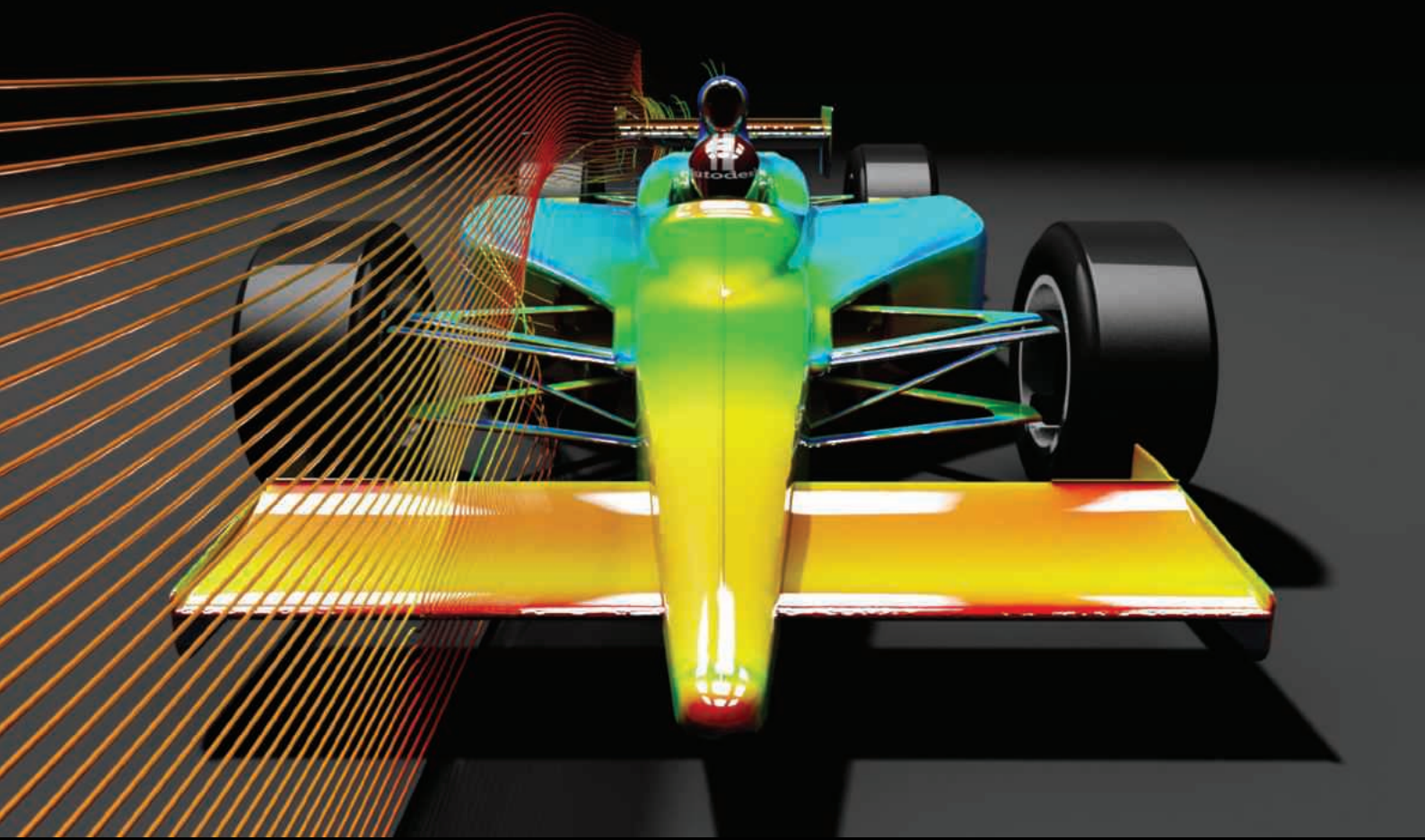

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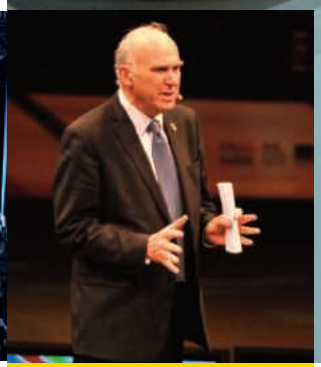
Skills Show sets the

Taking place between 15th and 17th November, the Skills Show 2012 was a remarkable showcase for the UK's young engineers. Paul Fanning reports.

Attending the opening ceremony of the Skills Show 2012, it rapidly became clear that this event was going to represent a more comprehensive, high-profile and considered approach to the UK's skills issue than most of us are used to seeing. Taking place in the LG Arena of the NEC and including dancing, acrobats, music, celebrities and TV personalities – not to mention the Business Secretary Vince Cable, the ceremony was clearly designed to start the show with a bang and succeeded in no uncertain terms.

At the ceremony, Cable outlined the show's essential mission, which was to raise the profile and prestige of vocational skills training and to attract young people to this route. He said: "I want to see a world where it isn't just the 40% of young people who go to university that we celebrate, but the others who are acquiring vocational skills and training which is every bit as valuable – if not more so."



Above: Business Secretary Vince Cable addressed the opening ceremony on the importance of skills and vocational education in general

While acknowledging the difficulties posed by the UK's financial position, Cable nonetheless pointed to the successes already achieved in the area of skills training, citing a million people currently going through apprenticeships – a figure that has risen 60% in the last two years.

By its nature, however, the opening ceremony was only ever going to offer a foretaste of what was to come the following morning. As it transpired, 70,738 people visited The Skills Show to be inspired by demonstrations of skills in action and receive information and advice on careers and training opportunities. More than 60 'Have a Go' areas allowed visitors the chance to try a 'bite-sized' activity in a new skills area, while over 50 Spotlight talks by a range of industry experts provided an insight into the realities of working in vocational skills. In addition to providing onsite advice, careers advisors made appointments with more than 1,000 young people to offer one-on-one interviews and counselling in the following weeks to assist with finding the perfect training course, apprenticeship or job.

The Skills Show is designed not only as a showcase for the UK's skilled industries, but also as a venue for competitors in the WorldSkills UK competition to display their skills and compete for medals and a chance to take part in next year's WorldSkills competition in Leipzig. Thus, the show offered a balance between introducing young visitors to professional skills through displays and hands-on opportunities and other skilled young people competing in earnest by displaying the skills they had already acquired.

Over 500 people took part in 61 WorldSkills UK National Competitions in skills ranging from Aeronautical Engineering to Landscape Gardening. The competitors secured a place in the WorldSkills UK Competitions after competing in regional heats throughout the UK. They battled it out to win Gold, Silver and Bronze

Gold Standard

Above: Jenny Westworth of BAE Systems (centre) was crowned as the first ever National Apprentice Champion of the Year

and ultimately be named the 'best of the best' in the UK at their chosen skill.

Exhibitors at the show included colleges, universities and learning providers from across the whole of the UK, there to talk to visitors about the different entry routes into a host of career sectors. What is more, some of the biggest names across a vast range of industries were on hand to inspire the next generation. In the engineering sector alone, top employers such as JCB and Jaguar Land Rover also showcased their programmes to attract the brightest talent.

Although the skills represented at the Show covered everything from landscape gardening to hairdressing, it was no surprise given the immediacy of the skills crisis facing the sectors that engineering and manufacturing were well represented by a range of major companies. Chief among these was BAE Systems, which acted as a headline sponsor of the event.

BAE Systems formed part of the 'Manufacturing Showcase' alongside Jaguar Land Rover, JCB and MBDA and demonstrated some of the latest technologies and capabilities from across the company. The exhibit was manned by current and graduated apprentices from across its UK business.

As part of its display, BAE Systems invited its visitors to 'have a go' at building their own aircraft from an in-house, pre-manufactured kit – something that proved predictably popular. It also had a number of apprentices presenting Spotlight Sessions at the show sharing their unique experiences and knowledge. Rachael Carr, an apprentice at the firm, said: "Our make-it challenge is a fun element to try and capture a young person's imagination and get them into an engineering and manufacturing mind-set."

Kate Watcham, BAE Systems' head of media, was effusive about the show, saying: "The first Skills Show was an enormous success and as the lead sponsor we were delighted to see so many young people, teachers and parents enjoying the event. Our stand was manned by some of our 1000 UK apprentices with an additional 15 apprentices taking part in the manufacturing and engineering competitions. I'd encourage any organisation reliant on vocational skills to consider supporting The Skills Show. It's vital for companies to assist events and programmes that are directly involved in encouraging young people to acquire real skills that will lead directly to employment."

Jaguar Land Rover's Showcase stand included 4X4 in Schools Technology Challenge remote controlled vehicle tasters, a Jaguar Primary Schools Challenge reaction time challenge, an Education Business Partnership Centre robot challenge and an immersive technology unit that demonstrated how driver/car connectivity in the future will make the driving experience simpler and safer. Several of

JLR's apprentices also gave 'Spotlight' talks about their careers.

Les Ratcliffe, Head of Community Relations at JLR, said: "We are pleased to support the Skills Show to inspire young people who are considering their future careers. Jaguar Land Rover is committed to promoting the Science, Technology, Engineering and Maths (STEM) agenda through our national education programmes to address the national shortage of engineers. The hands on activities at the Skills Fair will give students an insight into the exciting career opportunities available at Jaguar Land Rover and will encourage more youngsters to consider careers in engineering and manufacturing."

Another sponsor of the show was Premier EDA Solutions, the UK reseller of Altium Electronic Design Software, which acted as training provider to those taking part in the national WorldSkills UK Industrial Electronics Competition. Giving his reasons for this level of support, the company's managing director Phil Mayo said: "One of our long-term goals is to encourage and enable young talented people to enjoy viable careers in the UK electronics industry. Having been involved on the periphery of WorldSkills London 2011, we are delighted to play an active part in WorldSkills UK and are already pleased with the Squad UK result of 4th place at EuroSkills 2012. By providing our expert design skills training for the competitors, we strive to make a positive difference – not just for the competitors but for the industry too."

"Quite an Experience"

Festo, too, supported the Show and the company's didactic manager Babak Jahanbani was impressed, saying: "We have just under 400 apprentices at Festo, so this whole business of apprenticeships is quite important to us. Events like World Skills and UK Skills let us see the best amongst apprentices and what they're capable of. Everybody's reservation was that it wouldn't compare to WorldSkills London 2011, but it did. Everything was the same if not better. The show is going from strength to strength and getting bigger and bigger. It was quite an experience."

At the heart of the event, however, were the young people themselves. As well as those competing in the WorldSkills Event, others were honoured as part of the ninth National Apprenticeship Awards Ceremony.

As part of this ceremony, Jenny Westworth, a Semta-certified advanced apprentice, was crowned the first ever national Apprenticeship Champion of the Year. Now a manufacturing engineer at BAE Systems, 23 year old Jenny won after polling the highest number of public votes from a shortlist of 12 regional winners. The award was presented at the ninth National Apprenticeship Awards ceremony.

The Apprenticeship Champion of the Year award recognises the significant impact apprentices make to their employer's business development and growth and the former apprentices' role in championing Apprenticeships to schools, young people and the public at large.

Jenny, who completed a Semta Advanced Apprenticeship in Aerospace Engineering at BAE Systems in 2010, now combines her job working on Typhoon Aircraft with studying for an Aeronautical HND. She was nominated due to her significant achievements at BAE Systems and her role as an Education Ambassador for the company and also a STEM ambassador for her region.

Engineering Gold Winners at the Skills Show

Simon Todd, Qinetiq
Aeronautical Engineering: Avionic – Advanced

Luke Greenaway, Qinetiq
Aeronautical Engineering: Mechanical – Advanced

Nick Jones, Reading College
Industrial Electronics – Advanced

Meghann Butler, Napier University
Industrial Control – Advanced

Sam Robinson, BAE Systems
CNC Milling – Advanced

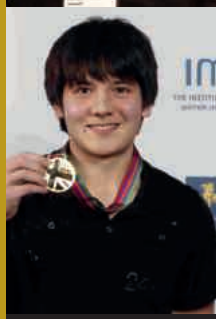
Owen Heward, Rolls-Royce PLC
CNC Turning – Advanced

David Liptrot, BAE Preston Training Centre
Mechanical Engineering: CAD – Advanced

Andrew Craig, Motherwell College
Mechanical Engineering: CAD – Higher

David Cargill, Northern Regional College
Mechatronics – Higher

Simon King, Northern Regional College
Mechatronics – Higher



Above: Nick Jones of Reading College took the top accolade in Industrial Electronics

Top: David Liptrot of BAE's Preston Training Centre won gold in Mechanical Engineering: CAD

Jenny was keen to emphasise the value of the vocational education her apprenticeship had given her, saying: "For me, I felt there was much more opportunity from an Apprenticeship and it's given me the chance to see and understand a business from different angles."

Also keen to emphasise the value of the vocational route was Beth Sherbourne, who was named was named the Higher Apprentice of the Year as part of the Awards. At just 22 she has become a senior procurement officer at MBDA missile system's plant in Bolton, having studied for her degree during the four-year apprenticeship, supported by Semta, the sector skills council for science, engineering and advanced manufacturing and its training partner EAL.

She said: "I was working part-time in a supermarket and had intended to go to university," said Beth, "but a lot of my peers had done the same thing and found themselves still working there when they got their degrees. Then I saw the advert for an apprenticeship in engineering and business at MBDA. My experience has made me passionate about how apprenticeships can make a real difference to someone's life and to a business."

https://worldskillsuk.apprenticeships.org.uk

Charlie Jessey
Technical Support Engineer

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Quiet efficiency

Professor Dowling is head of the Department of Engineering at the University of Cambridge, where she is also a professor of mechanical engineering.

During her career, she has held visiting posts at MIT and Caltech in the US. Her research is primarily in the fields of combustion, acoustics and vibration and is aimed, in particular, at low-emission combustion and quiet vehicles.

She is one of the founders of the Energy Efficient Cities initiative in Cambridge and was the UK lead of the Silent Aircraft Initiative, a collaboration between researchers at Cambridge and MIT which resulted in the conceptual design of an ultra low noise and fuel efficient aircraft, the SAX40.

Professor Dowling is a fellow of the Royal Society and a fellow of the Royal Academy of Engineering (where she was vice-president between 1999 and 2002). She was appointed CBE for services to mechanical engineering in 2002, DBE for services to science in 2007, and received an honorary ScD from Trinity College Dublin in 2008.

A class of her own

Laura Hopperton talks to the head of one of the largest and most prestigious engineering departments in the UK about the challenges currently facing the industry and what is being done to solve them.

As with so many leading engineers, for Professor Dame Ann Dowling,, who heads the Department of Engineering at the University of Cambridge, the seeds of her career were sown at an early age.

"It all started with a summer job at the Royal Aircraft Establishment in Farnborough," she says. "I spent two summers there researching aircraft noise after completing an undergraduate degree in mathematics at Cambridge. At the time, Concorde was carrying out its proving flights and noise had become the issue that would decide whether or not it would be allowed to land in the US. It was an exciting time that proved crucial in the development of aviation."

Indeed, it was researching aircraft noise at this young age that would help Professor Dowling identify what would become her area of specialisation. Her current role is the latest chapter in a glittering career which has seen her widely acknowledged as one of the industry's most respected figures in the areas of combustion, acoustics and vibration.

Enthused by her experiences at the Royal Aircraft Establishment, Professor Dowling made the decision to switch from mathematics to engineering and embarked on a PhD in aircraft noise, once again at the University of Cambridge. However, because there was less interest in noise reduction at that time, she began to work on other areas of unsteady flow, such as underwater acoustics. The focus at first was on sonar systems used by the UK Ministry of Defence, and then acoustic streamers used in the oil industry.

"After that I got interested in combustion - particularly lower emission combustion. And that's really what's been at the heart of my research since," notes Professor Dowling. "It's about enabling combustion to occur with less harmful emissions than before and with good efficiency."

One of the most high-profile projects Dowling has been involved with was the Silent Aircraft initiative, a collaboration between the University of Cambridge and the Massachusetts Institute of Technology in the US. Established in 2003, the project had the aim of developing a conceptual design for an aircraft whose noise would be reduced down to the background noise level in an urban environment.

"The Silent Aircraft initiative is one that sticks in my mind as great fun," Professor Dowling recalls. "There were about 40 of us working on the project over a period of about four and a half years. We really wanted to make a difference – not just shave off a few decibels – and eventually came up with a conceptual blended-wing design that was 25dB quieter than any commercial aircraft in service at the time."

One of the main reasons Professor Dowling decided on a career in engineering, she says, is because she could see the real difference it could make. "I think that's a message that has really gotten across to younger generations as well," she notes. "When the rise in tuition fees came in we weren't sure what effect it would have on the department. Most engineering degrees are four year courses, so it's a big investment. In actual fact, all the evidence pointed to the fact that graduates were choosing the courses that would give them a job at the end of it. It's no secret that those who have completed engineering degrees are among the best paid and no wonder the number of applicants we've received has gone up by about 60% over the past seven years."

"We really want to inspire a generation and make them go away and think about what can be done to address these global challenges"

Professor Dowling's latest venture sees her taking part in a major international summit being held in London next year that will explore new approaches to solving some of the world's most pressing challenges. The inaugural, two-day summit is a new collaboration of the Royal Academy of Engineering and the national academies of engineering in the US and China. The emphasis, she says, is on finding engineering solutions to issues such as sustainability, resilience of infrastructure and climate change.

Other themes include health, education, technology and growth, and 'enriching life'. "The last one is all about the way in which engineering and technology can underpin not just these big serious topics, but the creative industries and the fun things in life," Professor Dowling says. "We really want to inspire a generation and make them go away and think about what can be done to address these global challenges. It's about making everybody aware of the vital role engineering has to play."

** The Global Grand Challenges Summit is to be held in London between 12th and 13th March 2013. For more information, visit www.raeng.org.uk.*

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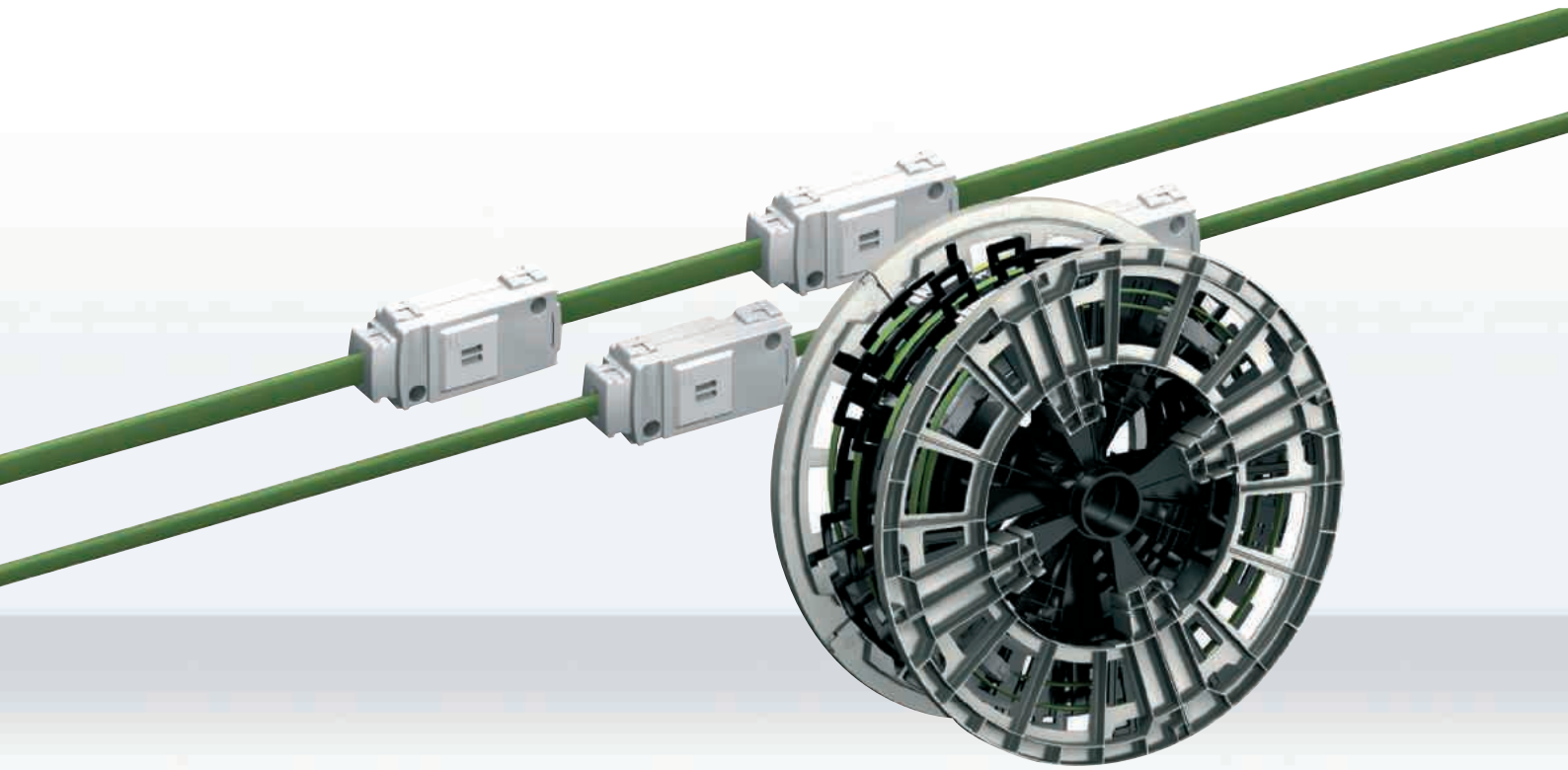

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Spectroscopy offers answer to liquids ban

A screening solution devised by a British company could help facilitate the easing of the ban on taking liquids onto aeroplanes. Paul Fanning reports.

Anyone who has travelled by air since 2006 has become tediously familiar with the process of having to sift through one's hand luggage for any gel or liquid likely to cause a security breach. Most of us have experienced the frustration of having packed our bags, only to realise that there is something in our washbag or elsewhere that contains more than 100ml of fluid or gel.

The fact is, however, that ever since a group of terrorists plotted to bring down passenger airliners with liquid explosives, this frustration has become a fact of all air travellers' lives. However, a new system developed by a British company may offer an answer.

The Insight100 from Cobalt Light Systems is a table-top, container-screening device for use at security checkpoints. It uses a technique called spatially offset Raman spectroscopy (SORS) to measure the chemical composition of liquids, powders or gels within sealed containers rapidly and accurately without touching or changing the sample.

SORS involves the use of a near-infrared laser directed at a test subject at multiple points. A small proportion of the light reflected back at each point is shifted in wavelength by the energy levels in the liquid molecules, the size and nature of which reveals what the substance is. The Insight100 acquires the reflected, shifted spectra before comparing them against a library of SORS signatures, enabling it to determine the presence of hazardous substances and material threats.

The Insight100 can analyse bottles of up to three litres in less than five seconds. The container is simply placed inside the unit and the door is closed. If a threat is identified, an alarm is triggered and the automatic door is locked. If not, the door opens automatically for the next container.

The underlying technology has been adapted by Cobalt from its systems for non-invasive, sub-surface analysis in laboratory, pharmaceutical and industrial applications. It is exclusive to the company and was invented at the Science and Technology Facilities Council's Rutherford Appleton Laboratory.

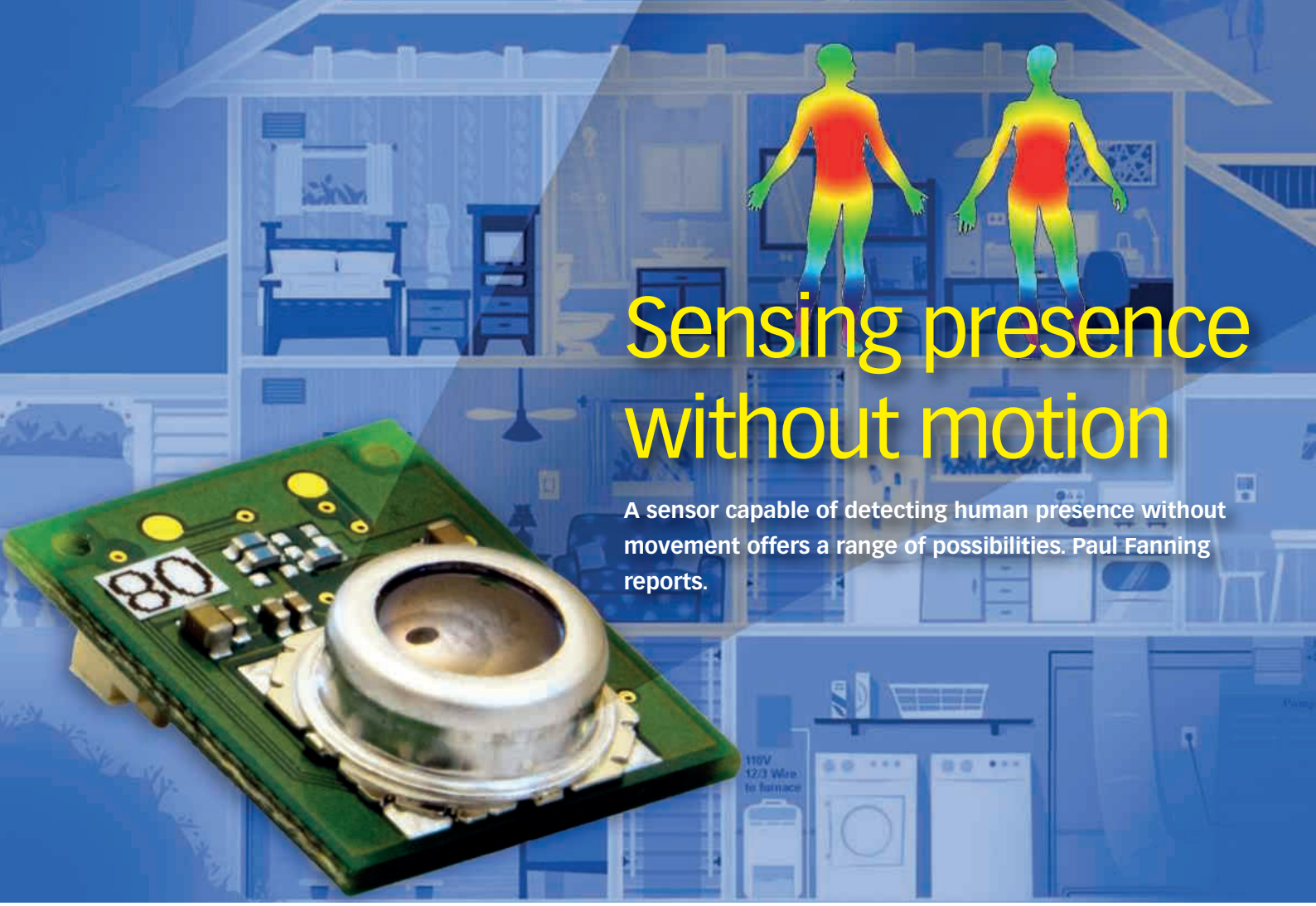
This process offers clear advantages over alternative technologies, according to Stuart Bothron, Cobalt's vice president, product development. "While other technologies have to operate on the balance of probability, SORS offers a precise and unambiguous chemical fingerprint that is unique to the substance being analysed and which precisely identifies the threat material."

The key benefits offered by this system are its high detection capability, low false alarm rate and high throughput. Stuart Bothron points out that these factors have to be balanced to see the true effectiveness of the system. He says: "Our system is fast, but it's not the fastest out there. There is one that's faster. However, most of its competitors have false alarm rates in the 'teens, whereas ours is less than 0.5%. So when you consider the delays brought about by false alarms on more than one in ten items put through a machine, the sheer speed of processing items is far from the most important thing."

The UK Government and the EU are currently working on plans to ease the liquid ban in 2013. As one of the few machines to have achieved the European Civil Aviation Conference (ECAC): Type B Standard 2, which allows it to be used as an alarm resolver in conjunction with existing X-ray scanning systems or as a stand-alone screener, the Insight100 is well-placed to capitablise.

The system has undergone extensive testing at a range of airports across the world, the feedback from which Bothron describes as "very positive".

www.cobaltlight.com



Sensing presence without motion

A sensor capable of detecting human presence without movement offers a range of possibilities. Paul Fanning reports.

There is no shortage of sensing technologies capable of detecting human movement. Indeed, simple passive infra red detectors achieve this very successfully and are a common feature in many households. However, detectinh human presence in an area without movement is not so simple. However, this is what is by Omron's D6T non-contact MEMS thermal sensor, a super-sensitive infrared temperature sensor that makes full use of Omron's proprietary MEMS sensing technology.

Unlike typical pyroelectric human presence sensors that rely on motion detection, the D6T thermal sensor is able to detect the presence of stationary humans by detecting body heat, and can therefore be used to switch off unnecessary lighting, air conditioning, etc automatically when people are not present (regardless of whether they move or not). As the D6T sensors are also able to monitor the temperature of a room, they can also be used to maintain optimal room temperature levels, instantly sense unusual changes in temperature, thereby detecting factory line stoppages, or discover areas of overheating for early prevention of fire outbreaks, etc.

Thermal sensors utilise the Seebeck effect in which thermoelectric force is generated due to the temperature difference at the contact points between two different kinds of metal. A thermopile is created by serially connecting thermocouples consisting of N+ poly Si , P+ poly Si, and Al. By creating hot junctions on highly heat-resistant dielectric membranes, and cold junctions on highly heat-conductive silicon, it is possible to achieve high-speed response and high-energy conversion efficiency (infrared rays, temperature, thermoelectric force).

D6Ts are created entirely from Omron's proprietary MEMS, ASIC, and other application-specific parts to ensure high sensitivity. They offer a particularly high signal-to-noise ratio, with a Noise-Equivalent Temperature Difference of 0.14 degrees Celsius.In addition, their low visual field crosstalk characteristics enable high-precision area temperature detection.

While standard thermal sensors are only able to measure temperature at one certain contact point, the D6T can measure the temperature of an entire area contactlessly. Signals generated by infrared rays are usually extremely weak, and high-sensitivity detection is therefore very difficult to achieve. However, Omron has developed and manufactured in-house every part of the new thermal sensor, from the MEMS sensors to ASICs (application-specific integrated circuits) and other application-specific parts, specifically with the aim of ensuring that the D6T is capable of highly sensitive detection.

The technology behind the D6T thermal sensors combines a MEMS micro-mirror structure for efficient IR radiation detection with a high-performance silicon lens to focus the infrared rays onto its thermopiles. Proprietary application-specific integrated circuits then make the necessary computations and convert sensor signals into digital I2C outputs. All components were developed in-house and are fabricated in Omron's own MEMS facilities. The result is high ±1.5°C accuracy with excellent noise immunity (measured as noise equivalent temperature difference) of 140mK.

In terms of applications, there is no shortage of possibilities. These range from aiding in the creation and development of new advanced energy-saving household appliances, through the enhancement of home and building energy management systems to a wide variety of factory automation applications. It could also be used in healthcare applications to see if a patient has left the bed.

www.omron.com

Simulation software offers solutions

Simulation and analysis offer benefits to designers in diverse industries. Paul Fanning looks at some examples.

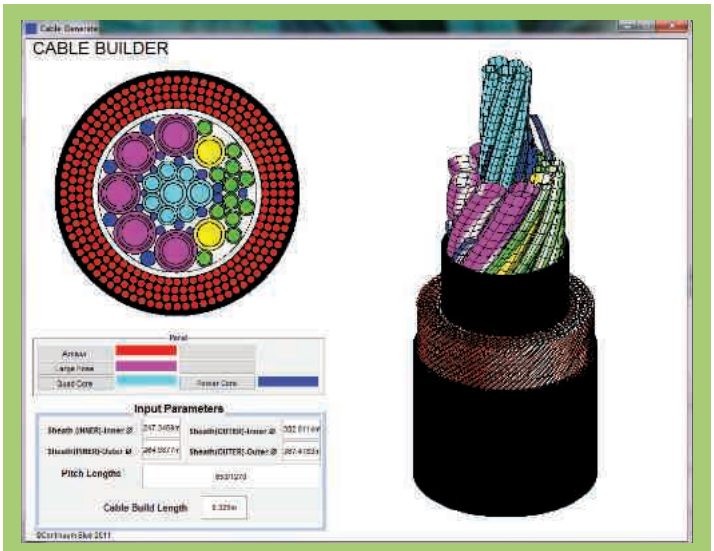
The use of simulation and analysis software is well known in a range of applications. However, it can nonetheless be instructive to examine individual case studies to demonstrate the way in which such technologies can overcome major obstacles and radically enhance design.

Two UK-based examples offered by leading multiphysics engineering simulation software provider Comsol concern the design of underwater cables for the offshore oil and gas industry and the optimisation of lubricants in complex friction problems. The first of these involved JDR, which custom-designs and manufactures subsea power cables, umbilical systems and reeler packages for a broad range of applications in the oil and gas and renewable sectors.

Because umbilicals are long, they need to be strong, and are generally very heavy and difficult to handle. Thus, the physical testing of these cables is cumbersome and expensive. Tim Poole, design automation engineer, is responsible for testing and analysing products at JDR and says: "In order to understand fatigue properties and performance, a typical fatigue regime for an umbilical is to undergo 100,000 usage cycles around a sheave wheel on a large fatigue rig. At approximately 6,000 cycles per day, plus all the other required testing, it takes at least a month to complete the process and costs between $30,000 and $50,000 for all the resources involved. It is critical that we can predict the behaviour of our products to ensure they meet the requirements, so while physical testing is very important, it has its limitations. Apart from the time and cost factors, we cannot replicate conditions 100%."

Umbilicals pose a particularly complex analysis challenge, as Poole explains: "Typically they incorporate multiple layers of wire with helical geometries and multiple contact points, or they contain aramid (Kevlar) braid, a synthetic material that is very difficult to analyse because of its braided construction." JDR therefore turned to COMSOL Certified Consultant, Continuum Blue for some specialist assistance.

Dr. Mark Yeoman of Continuum Blue picks up the story. "Our starting point was a 2D cross-section of a cable, including material specifications. What was of concern was that the cable cross-section had a double-armour layered structure with 50-60 armour wires in each layer, where each layer twisted along the length in the opposite direction to the other. Building the model to reflect bend and axial load conditions with contact for the internal structures was done, but also included adding in the contact for these counterrotating armor wires. This resulted in well over 3,000 localised regions of high contact pressure along a unit length of cable, creating high stresses at every point of contact."



Umbilical cables incorporate multiple layers of wire with helical geometries and multiple contact points

Continuum Blue's answer was to build a bespoke program, so that JDR could quickly and easily generate the 3D cable structure through COMSOL's Livelink for MATLAB and then build the COMSOL cable model. The MATLAB code added advanced material properties and relations from Continuum Blue's extensive materials database, and utilised these properties to help define the bespoke contact expressions and parameters that were necessary to solve the contact analysis.

Everything was then imported into COMSOL Multiphysics so that it could be solved.

"The first time we adopted this approach, it worked really well," comments Poole. "The models were clear, the local stress analysis was reliable and we were able to feed the values obtained into our OrcaFlex models." JDR has now worked with Continuum Blue on developing its capabilities, and JDR can now analyze subsea cable structures with multiple internal counter-rotating structures and up to six protective armour layers with ease. From ten weeks on the original project, turn-around time is now down to two weeks and the amount of data produced has risen five-fold.

By contrast, Shell Global Solutions was seeking a reduction in lubricant viscosity – regarded as one of the key approaches to energy efficiency, and the choice of base oil is significant. There is a move towards synthetics, in which molecules are highly controlled, often by further processing of mineral base oils. 'Slippery' chemical additives, called friction modifiers, are also being used. In general, energy-efficient lubricants deliver lower friction because the oil film thickness in the contact is reduced.

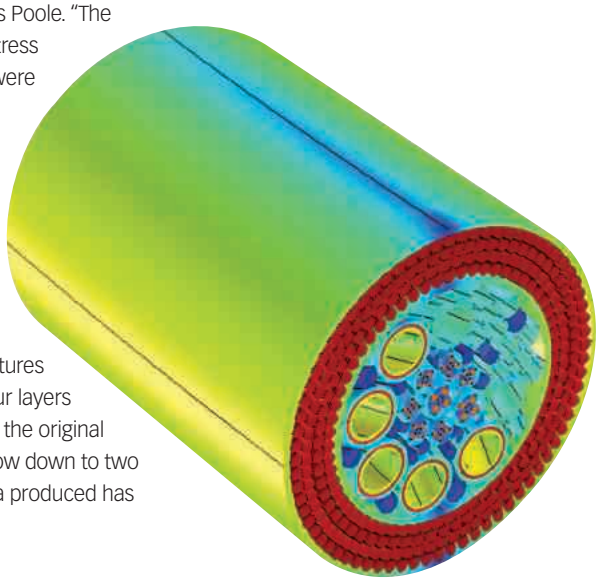
Of course, if oil film thickness is reduced too much, there is the possibility of higher wear. It is therefore particularly important to be able to predict the effect of lubricant properties on the thickness of the oil film and the friction of a lubricated contact. "For lubricated contacts, such as plain journal bearings or piston rings, and pressures below 200 MPa, the Reynolds' equation can easily be solved to predict oil film thickness and friction," comments Dr Robert Ian Taylor, technology manager at Shell Research in the UK. "However, there are many important lubricated contacts, such as gear teeth or rolling element bearings, where extremely high pressures of up to 3 or 4 GPa can be generated in the lubricant."

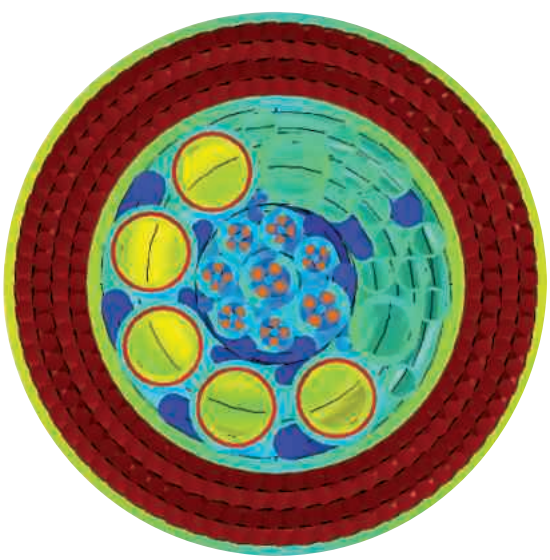
Under such pressures, the viscosity of the lubricant increases dramatically, causing metal surfaces to deform elastically. As a consequence of these two effects, the oil film thickness is greater than otherwise expected, which is exactly why such high-pressure contacts can be successfully lubricated. The fact that high pressure promotes lubrication rather than hinders it can seem non-intuitive. The key is to account for these two effects when predicting performance.

Finite element analysis, using a multiphysics solver, is an approach for taking into consideration all of the participating properties. Says Dr Taylor: "We wanted to solve the Reynolds' equation on the contact line or surface; find the pressure in the lubricant; use that calculated pressure to calculate the elastic deformation in the underlying surface; then use the changed surface shape to recalculate the pressure distribution. However, the proprietary solver code is not so straightforward to modify and it sometimes poses a steep learning curve for newcomers." Members of the Shell team are increasingly turning to COMSOL Multiphysics for complex lubrication problems.

Over the past three years, the team has been using both systems to confirm that they obtain the same results from COMSOL Multiphysics as they do from their own solver. "It is still easy to use the solver for some problems but we use COMSOL for more difficult issues," says Dr. Taylor. "One of the fundamental advantages of COMSOL is that we can develop models without any lines of code whatsoever. This makes maintenance and modification of models much simpler. It is also much easier when we need to consider real lubricated contacts. These are rough, at the micron scale, and so a typical 3mm contact would need to be described by approximately 1,000 nodes, if we model it accurately. This would take up too much computer time and memory for the direct method used in the proprietary solver"

www.comsol.ltd.uk





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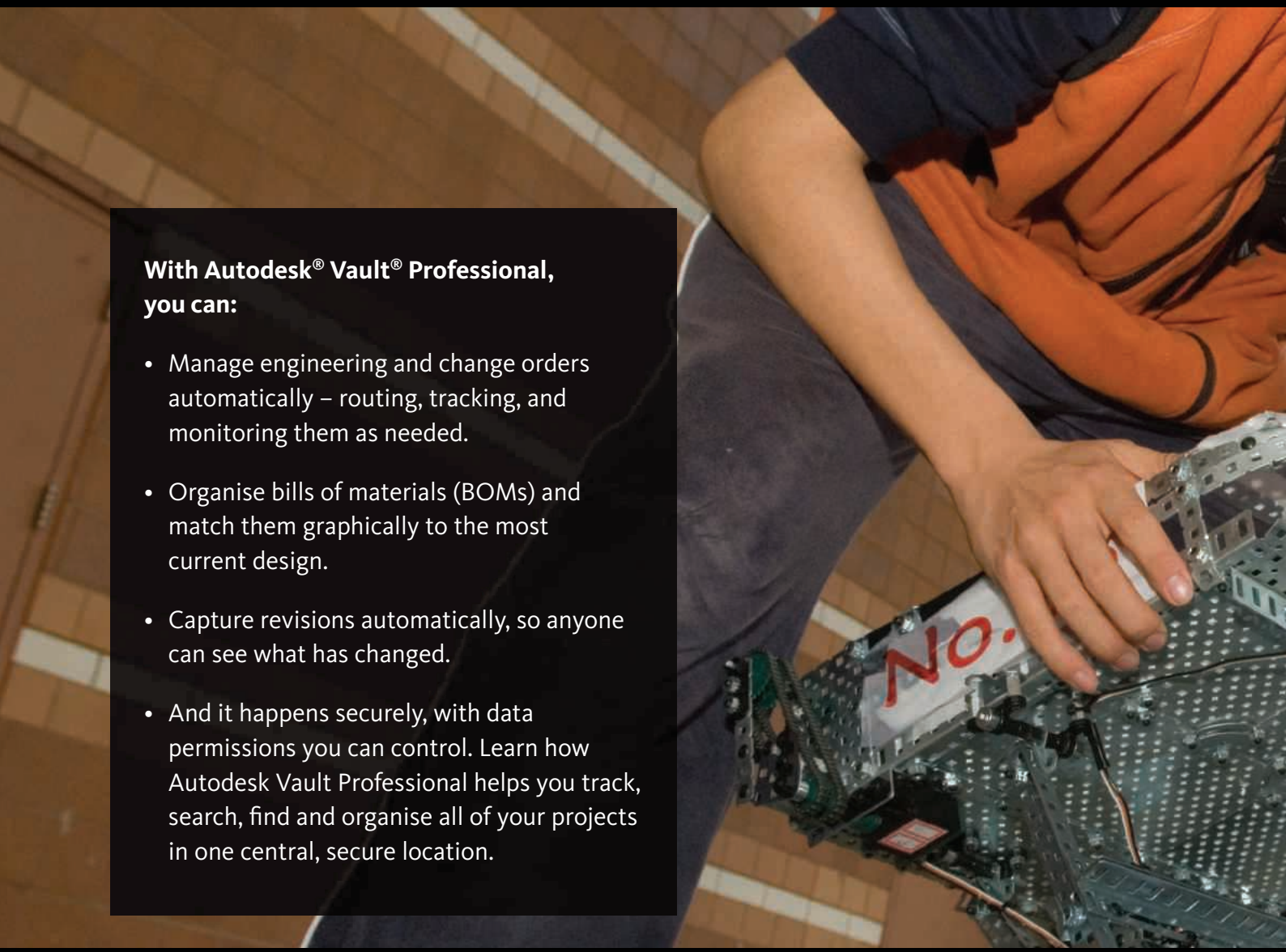

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Richard Hall, President Automotive for Schaeffler UK 30

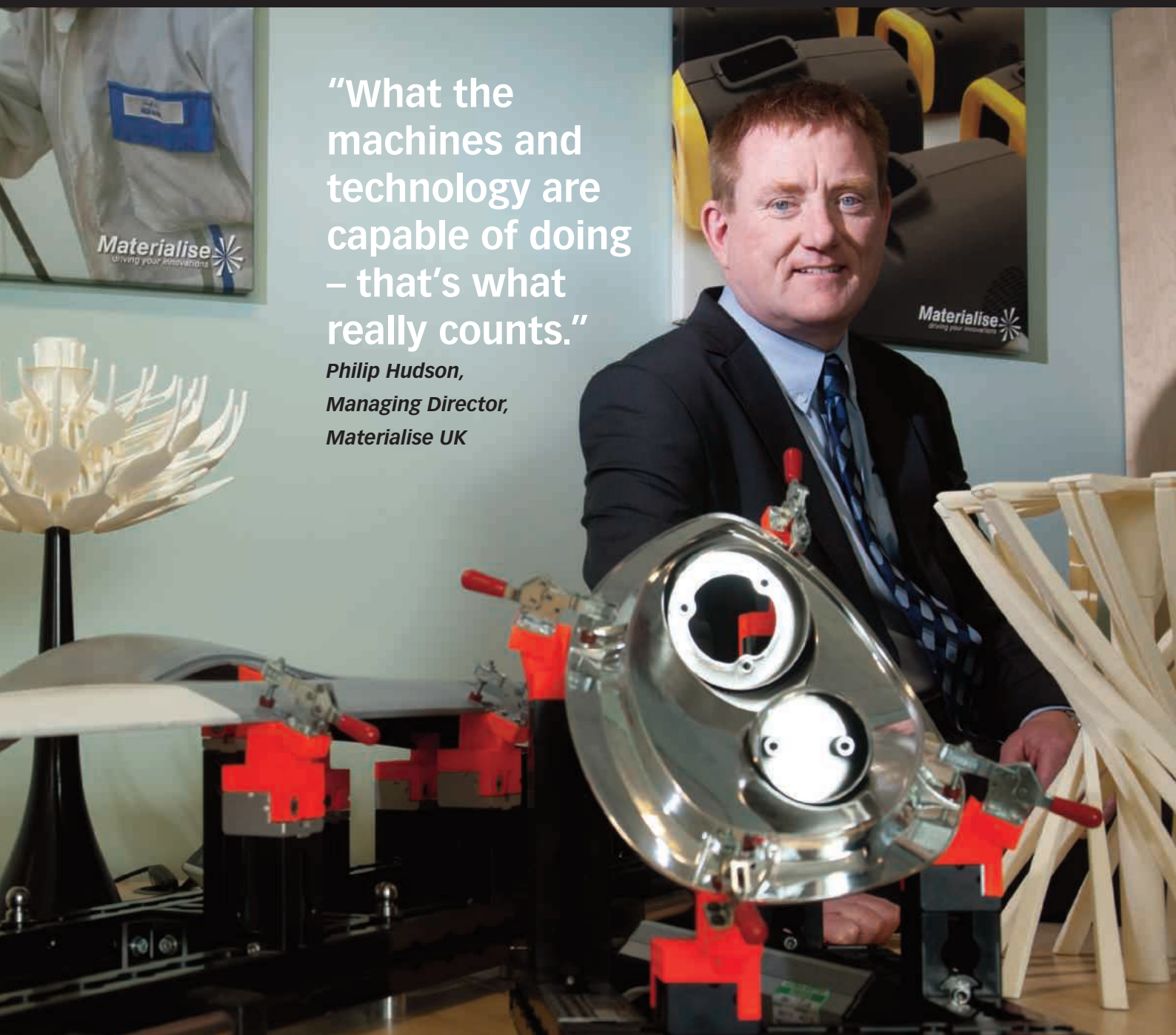
TFC Group Managing Director Martin Clarke 35

Neil McArthur, NT CADCAM's Sales and Marketing Director 36

Bob Arnott, Managing Director of Centa 39

In this year's View From The Top, *Eureka* talks to some of the leading lights of the engineering and manufacturing sectors with a view to taking the pulse of the industry as a whole.

VIEW FROM THE TOP



"What the machines and technology are capable of doing – that's what really counts."

Philip Hudson, Managing Director, Materialise UK

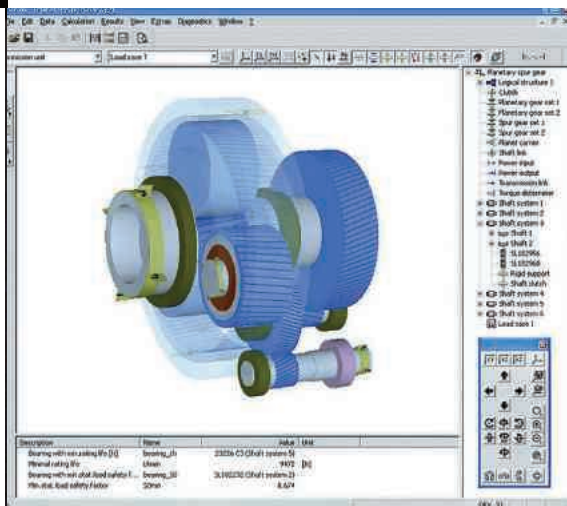
"By working in close partnership with vehicle manufacturers, suppliers can react much faster."
***Richard Hall**, President Automotive for Schaeffler UK*

With a resurgent UK automotive sector, now is the time to invest and innovate, says Richard Hall, President Automotive for Schaeffler UK.

The UK automotive sector is hugely important to the UK economy, employing more than 700,000 people and investing over £1.5 billion in R&D every year. The strength and capability of the automotive supply chain is a critical factor in driving growth and attracting inward investment.

According to the SMMT (Society of Motor Manufacturers & Traders), around a quarter of automotive companies in the UK are Tier 1 suppliers supplying directly into UK-based OEMs, and 42% are Tier 2. Over the last two years OEMs have pledged more than £6 billion of investment in the UK automotive market generating huge growth opportunities across the UK supply chain. A recent survey carried out by the Department for Business, Innovation and Skills has revealed that UK-based OEMs want to source £3 billion worth of product from UK suppliers. With the UK being such a high producer of engines, it's hardly surprising that a high proportion of this figure relates to commodities for the engine such as castings, forgings and accessories.

So why are UK-based engine manufacturers now looking to localise



Schaeffler UK

Building a stronger supply chain

component suppliers? Ford, for example, produced over 1.7 million engines at its Bridgend and Dagenham plants in 2011 out of a UK production total of 2.5 million. First, it is critical that these companies manage their supply chain inventories and the deliveries of engine components to their UK engine plants. For example, in the case of Ford, having Schaeffler's tappet production plant located just 20 miles from its Bridgend engine plant, means that it can take delivery of graded engine tappets in smaller batches and more frequently, as and when it requires them, with far less supply chain risk than if it had to import from the Far East or South America.

This growing interest and commitment from global vehicle manufacturers to source more components in the UK is being supported by the Automotive Council and the SMMT, which has set up and hosted six separate 'Meet the Buyer' events since 2010. These networking events are designed to match OEM- sourcing demand with UK suppliers.

As a manufacturer of high-precision mechanical tappets for internal combustion engines, Schaeffler UK is reaping the benefits of this inward investment by the OEMs. It recognised some years ago that it needed to invest in its UK production plant in order to support the major vehicle OEMs, investing heavily in new capital equipment for its plant in Llanelli, South Wales in 2011 and 2012. The company committed several million Euros in new surface coating technology for tappets, as well as a massive 66-tonne deep drawing press, that enables the plant to produce highly repeatable, superior quality mechanical tappets and other automotive engine components for OEMs.The investment in new capital equipment at Llanelli will enable Schaeffler to supply Ford with over 20 million low friction tappets per year if required. These tappets are already helping Ford to improve the fuel efficiency of its engines and to minimise CO2 emissions, particularly evident on Ford's new Ecoboost gasoline range.

Schaeffler supplies mechanical tappets for use on Ford's 3-cylinder 1.0 Ecoboost engine, which was recently named 'International Engine of the Year', voted for by more than 75 journalists from 35 countries. As well as tappets for this award-winning engine, Schaeffler supplies the VCT (variable cam timing) system, another technology that improves fuel efficiency and lowers CO2 emissions. For some regions of the world, Schaeffler will also supply an idler for the Front End Accessory Drive.

Schaeffler is continuously developing new lightweight, lower friction, more energy-efficient components and systems for vehicle engines, transmissions and chassis. This is helping to reduce the weight of the vehicle, improve fuel consumption and minimise CO2 emissions in order to help OEMs meet ever-tighter European vehicle emissions targets.

Innovation and collaborative working with vehicle manufacturers is also important. Ford and Schaeffler have worked together on a number of projects, both within and outside of the UK. As well as supplying tappets to Bridgend and Dagenham in the UK, Schaeffler supplies tappets for Ford's engines built in Spain, Romania, Germany, Brazil, India and China. Schaeffler even has a resident project engineer based at Ford's Dunton Technical Centre in Essex, who is responsible for ensuring the smooth integration of Schaeffler components and systems into Ford engines.

Resident engineers work closely with the vehicle manufacturer's design team, resulting in clearer, faster communication. In Schaeffler's case, any new automotive components, modules or system innovations can be communicated quickly and effectively to the design engineers. This usually includes tailoring a specific Schaeffler system or component for the customer.

By working in close partnership with vehicle manufacturers, suppliers can react much faster and can quickly identify new business opportunities. By having a resident engineer close to the customer, the supplier gains a deeper understanding of new, relevant R&D projects. Knowing what a vehicle manufacturer is working on now and in the near future is priceless information. This could help to generate more business in the form of more projects, which in turn leads to increased growth and security of jobs for the supplier. This increased business can then cascade down the supply chain to lower tier suppliers, ultimately resulting in benefits for UK plc as a whole. Of course, this close working also benefits the vehicle manufacturer since they can tap into the supplier's knowledge by quickly accessing the relevant areas of expertise within the organisation through the resident engineer.

www.schaeffler.co.uk

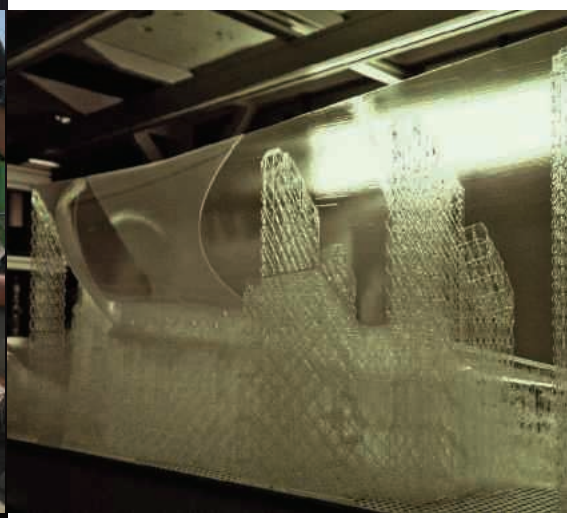
"The knowledge of what the machines and the technology are capable of doing. That's what really counts."
***Philip Hudson**, Materialise*

Materialise UK is at the forefront of developing additive manufacturing's place in design and manufacture. Paul Fanning reports.

Perhaps the best indication of the sheer breadth and depth of Materialise UK's operations and customer base is that its Managing Director Philip Hudson finds it virtually impossible to categorise the company.

He says: "People ask me what I do for a living and I find it hard to answer. We do so many things: the other week I was at Aston Martin one day; the next I was at a breast pump manufacturer; and the day after that I was watching someone have his hip replaced! And it was like that for two weeks with completely different applications every day. So the typical customer is anyone who's developing a product, a service or a process."

The reason for this level of diversity lies in Materialise UK's parent company. Based in Belgium, Materialise is a world leader in all aspects of additive manufacturing. Not only can it boast the largest number of additive manufacturing machines in any one site anywhere in the world, it also builds (but does not sell) some of the biggest additive manufacturing machines in the world. And, as if that weren't enough, it has created the software that Hudson describes as "the de facto solution



Innovating and educating

for additive manufacturing".

Materialise employs nearly 1,000 people worldwide, while the UK operation has recently expanded to 13 and has seen consistent growth. Indeed, the company saw growth of 17% during the depths of the recession and predicts growth of 20% per annum over the next few years.

As well as offering expertise and experience, Materialise has also innovated in terms of its customer interface. It offers a web-based service whereby users log on, upload a design, chose the technology, material and finishing degree, get an offer and then they can immediately place an order. Since parts can leave Materialise the same day, for an engineer there is no faster way to bring their design to life and see how it can be improved by holding it in their hands. In addition, there is also a more traditional prototyping service offered. Here, users can consult with Materialise's team to arrive at a quote. Finally, there is a more bespoke additive manufacturing arm that partners with customers to arrive at a design. This process can be crucial, says Hudson, because there is a need to work through the technical aspects of designing for this type of manufacture. "We work out the design with them," he says, "because they don't necessarily realise the criteria required to optimise a design for additive manufacturing. Therefore, our team is ready to help them."

The nature of this technology is such that a great deal of what Materialise does involves educating potential customers in terms of what it is possible to achieve. This, says Hudson, is often made easier by finding an individual within the company who can help champion additive manufacturing, there remains considerable resistance to its adoption within industry. He says: "There's a lot of evangelism involved. You do feel sometimes as though you're trying to convert people. The great thing is that often, there is a moment when the person 'gets it,' and one of the benefits of my job is to witness that. Some people are taught that there is one way of doing things and that's it, so when they finally see this new direction their eyes get bigger, their jaw drops a bit, and you know that their world has been changed. It's fantastic"

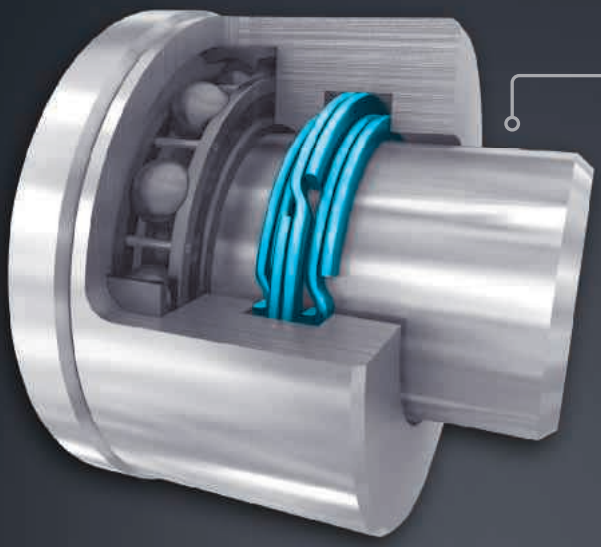
One thing that has helped to improve knowledge is the increased attention that additive manufacturing has received from the media of late. However, as Hudson points out, this has been a double-edged sword in a number of ways. Any presence in the marketplace is good," he says, "That said, there was a Newsnight piece featuring additive manufacturing and although it was great to see the technology make Jeremy Paxman nearly speechless, it can do so much more than create a replica of someone's face or a pen. I think that the segment simplified the technology a little too much and they could have done so much more and still have engaged the audience. That being said, it is nice to see that there is a buzz about additive manufacturing now and the press are doing a good job of picking it up and seeing that there is something there."

Another problem created by this 'buzz' is that it creates unreasonable expectations on the part of the customer. Says Hudson: "There's a presumption that you can do anything. Even on Newsnight where they were saying "You can print pens". Well, no you can't. You can print a tube and that tube will be quite expensive compared to a Bic. It is not fair to the audience to start promising that today you can print a pen and in the future you'll be printing your iPhone at home. It just isn't true."

Hudson believes that any 'dumbed down' or 'hyped' coverage of the subject serves to obscure the real achievements being made in the field. He says: "The real story is that we're printing components and assemblies much more sophisticated than anything we've been able to do before. You can build component parts now in a single piece with functionality in them and with internal channels for drainage and airlines. That's really clever design. The real added value of additive manufacturing is for products where the level of complexity is high, the volume low, and the ability to respond to changes can help ensure product success. In fact, we made an app we call the '3D Print Barometer' so that people can describe their part and see if additive manufacturing really is the best method for bringing that part to life.."

Hudson remains confident that the additive manufacturing market is only likely to grow over the coming years as a generation of engineers emerges from university that is familiar and comfortable with the technology. And, he believes, Materialise is in an excellent position to take advantage of this. He says: "I think Materialise is very well placed for that because of the sheer scale and size of its operations. Not just the number of machines we've got, but also the knowledge of what the machines and the technology are capable of doing. That's what really counts"

www.materialise.com



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Commercial evolution

TFC is extending its services to help customers reduce costs and make more profit. Simon Fogg finds out how.

One of the leading suppliers of technical fastener components, TFC's focus has always been on working with designers to help them produce better products. According to executive chairman Martin Clarke, after a management buyout in 2007, the company is now evolving services with a commercial emphasis.

"Since the new management team took over, one of the emphases we've had is to say we can go further with the customer," Clarke explains. "We talk to the commercial team about how we can reduce the overall cost."

He believes that TFC stands out because it aims to fundamentally understand its customers' needs – a relationship which can benefit manufacturing support operations to help take out cost throughout the process.

This involves aiding the acquisition of small components with systems that help customers manage issues such as storage and internal transport. "We've extended our product supply to a service supply where not only do we talk to customers about the product, but about the way they receive the product," says Clarke.

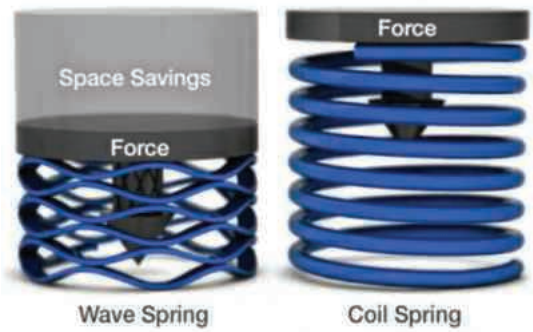
His example is that the cost of a screw is often only 30% of the total cost of acquiring it and getting it on the shopfloor. There's a lot of administration involved which TFC can take responsibility for and manage because it has the experience to do so. "We've perfected ways of handling small components efficiently in our own business and developed the technology and skills to do the same for our customers in their factories," adds Clarke.

One success story can be found in the automotive industry where the challenge is always to produce smaller and lighter. TFC has applied its wave spring products, a form of compression spring that is smaller than conventional helical springs, and enabled mechanisms to be more compact. Another could be TFC's involvement with connector companies, where Spirolox retaining rings have been used to make connector products smaller.

Once this technical relationship has developed, TFC can then offer to handle the more ordinary commodity products. "We combine the two worlds into a whole," says Clarke, "and we're able to follow the customer relationship, not just from the design side, but right through to the operations director who's responsible for getting their goods out on time."

Clarke observes that with this business model, it's important for customers to know that stock is always nearby. "What we've been doing over the last five years is putting in place the infrastructure to allow us to get more commercial with customers," he says.

This support is not limited to the UK as many customers move abroad to get closer to their markets. Clarke says that TFC has worked hard to ensure that if a customer needs it to support their factory, it has the resources to do so.



***Martin Clarke** TFC*

He also underlines that the company's focus is both technical and commercial. "We attract new customers through the technical route because that's the way to really get to the core of their product and their factory," he notes. The result is that TFC's turnover has grown from £7m in 2007, to a predicted £20m this year.

TFC has recently honed its systems and spent time developing lean manufacturing. These new services can now help assemble and manufacture a better product. Says Clarke: "What distinguishes us is that we always look to help our customers make more profit."

www.tfc.eu.com

"People think we must have saturated the UK engineering market with 3D software by now. But the reverse is actually the case"
***Neil McArthur**, NT CADCAM*

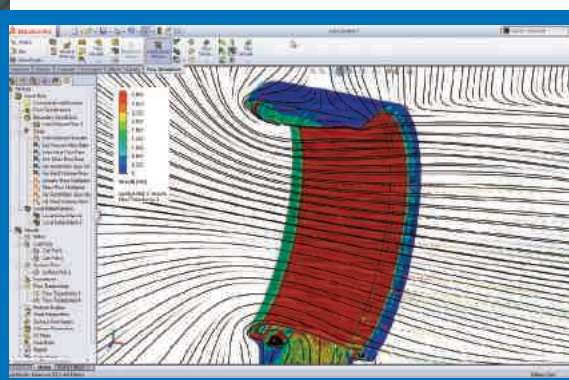
SolidWorks reseller NT CADCAM can boast a number of prestigious accolades. Paul Fanning finds out what makes it special.

Of around 430 resellers of its products that exist worldwide, a mere ten can lay claim to the status of 'Elite Reseller' bestowed by SolidWorks. Among this select group is UK's NT CADCAM, which can also boast a position as the only SolidWorks Tier 1 reseller in Northern Europe.

These accolades, according to NT CADCAM's sales and marketing director, are reflections not only of the company's commitment to serving its customer base and consistently improving its service, but of the quality of its people.

"Yes we've got great products and industry presence," he says, "but we understand that people buy from people. So we have invested in some very high-calibre people who are experts in their fields. We recruit high-calibre engineers and put them through a lot of certification. We hire degree-qualified engineers as sales executives. After all, SolidWorks is no different here than it is in China, Japan or the US. It's the quality of the people that train, support and implement it that makes the difference."

The Elite Reseller status is awarded based on NT CADCAM's quality of service, quality of attention and customer satisfaction, while the Tier 1 status reflects its ability to demonstrate, train, implement and support



An elite service

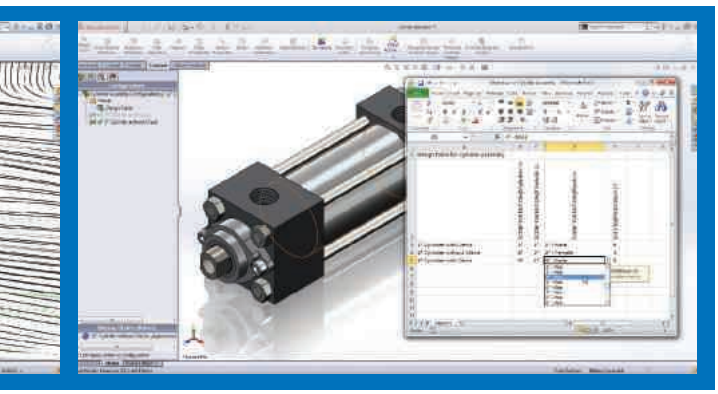
the whole of the SolidWorks portfolio. They are extremely hard-won, as McArthur makes clear: "SolidWorks put us through a lot of hoops and hurdles in order for us to achieve those quality metrics. While there is no direct financial benefit or preferential treatment, the fact that we've striven to make our company better is of huge benefit to our customers."

If the company's performance this year is any guide this benefit is clearly appreciated. In the last 12 months, NT CADCAM has brought in 223 new accounts, a performance that McArthur describes as "outstanding" and one that clearly gives the lie to any suggestion that the UK engineering sector is in any way saturated by 3D CAD. This is an idea that McArthur encounters regularly. He says: "People think we must have saturated the UK engineering market with 3D software by now. But the reverse is actually the case. There must be 100,000 companies in the UK designing and manufacturing products and a lot of them are still using traditional, manual methods to do so. So the world is our oyster in that respect."

Of the 223 new customers secured over the last 12 months, McArthur estimates that 20% were migrating from another 3D package to SolidWorks, with the rest adopting 3D technology for the first time. Even so, the company still meets considerable resistance to the adoption of 3D CAD. He says: "We come across every excuse in the book for not investing in this technology: 'We've always done it this way'; 'We went to the moon without 3D CAD', 'Our products don't lend themselves to 3D'; 'We don't need pretty pictures'; and 'We're quite happy with what we've got'. But if they took the time to look, they'd see a significant business benefit. There are a lot of customers out there who still draw their products in 2D because that's what they've always done and nobody's ever shown them what can be achieved by doing it in 3D modelling."

However, he believes that this is probably an issue that will change as a new generation of 3D CAD-trained engineers comes into the workplace. He says: "Most of the major engineering schools and colleges – and all the major Universities – are using SolidWorks. So we are educating the next generation of engineers in the benefits of 3D – and SolidWorks in particular."

One of NT CADCAM's key advantages in winning new business is the sheer breadth of its experience and customer base. This, says McArthur, allows it to demonstrate where it has solved problems similar to those faced by prospective customers. "One of the beauties of being 100% focused on SolidWorks," he says, "is that we come across engineering companies with similar problems. What I mean by that is that SolidWorks can solve numerous design and engineering challenges and we'll come across those every day of the week. So the benefit of us having done this for so long is that we have come across your problem before, solved it before and we've got a customer base of about 2,800 customers doing that on a daily basis."



In addition, the sheer variety of customers that NT CADCAM has means that it is able to offer experience in most fields. With customers in markets from industrial equipment to consumer goods, medical equipment and even the building of submarines, there aren't many sectors that are new to the company.

Even so, McArthur makes it clear that there are usually more similarities than differences in the problems faced by its customers – regardless of the sectors in which they work. And, for this reason, he says, NT CADCAM's approach remains fundamentally the same. "Ultimately, our focus is always on three things: we try to help our customers in time, cost and quality. If we can do things quicker, we save them time and money. We mix and match time, cost and quality all the time to make sure our customers get a return on their investment. We give them more time to design better-quality products."

Going forward, McArthur believes that the signs for NT CADCAM remain extremely positive, despite difficult economic conditions. In fact, he believes the difficulties of recent years have made companies more inclined to invest rather than less, saying: "I think recent events have meant that there is now a smaller number of competitive companies. So, rather than there being 10 companies in the market, there are five, but they are in a much stronger position. Now you've got five guys bidding for the same business and they've got to clearly differentiate themselves and will invest in techologies such as SolidWorks to gain a competitive advantage. So a lot of what SolidWorks can do for them is help them win that business."

www.ntcadcam.co.uk

Centa Transmissions

Engineering with purpose

Engineering is Centa Transmissions' purpose in life, as its managing director Bob Arnott tells Simon Fogg.

Bob Arnott, *Centa Transmissions*

A combination of customer confidence, quick response times and industry reputation has given Centa Transmissions its advantage in the mechanical transmissions market, according to managing director Bob Arnott. "That's the key to it," he says. "If people have got a problem, they feel they can come to us for a solution."

The company provides a standard and bespoke service for its drive technology, offering couplings for industrial equipment, plant and marine vessels, as well as precision gears, gearboxes and electromagnetic clutches. It also has created solutions for problem drives, often in excavators and test benches.

When designing prototype equipment for long running units, Arnott describes how the ability to respond swiftly to customers' requirements with both the initial design element and the subsequent manufacturing has put Centa ahead of its competition. "We do those quickly," he says, "so we're supporting the customers in a very quick and timely way which allows them to get their products into the market quicker." Involvement in bespoke engineering such as engine test benches has also proven successful, which he attributes to the technical competence of the company's in house facility.

Among the successes of the past year is involvement in a project with Caterpillar. "We were selected because we were the most responsive – within 10 days we delivered them a prototype," says Arnott. Otherwise, he notes that rather than focusing on one particular endeavour, the company tends to experience smaller success and build on them over time.

Much of Centa's business involves heavy construction equipment, as well as marine applications which each have very different requirements. "It's a broad base in terms of our customers," Arnott describes. "That fits us quite well." Notably because when one of the company's market areas is down, such as leisure marine, another such as workboats may be up to offer compensation and fuel the company's increasing turnover. "We've maintained quite a constant level of production," he says.

Each of Centa's markets has its own requirements. For example the difference between a work and leisure boat in terms of power and run time. "There are various nuances you've got to allow for in the design of the drive and by knowing these, you can design correctly and provide a reliable solution."

A generator coupling would not fit a marine propulsion unit, so covering these different applications has given Centa a diverse portfolio. "It's having the products in your portfolio and obviously the expertise to apply them," summarises Arnott. "And that's where we excel." Access to the correct solution means the right coupling is provided for the right job.

The economy may have had an effect on other companies, but Arnott is content with Centa's growth. "Things are still moving comfortably," he adds. Indeed, he appears highly optimistic about the company's future because its reputation is built on competence.

He says: "We're still confident about the future, but obviously you keep looking over your shoulder when you hear the news." Larger engineering companies which rely on government spending may be suffering, but he believes most of the engineering activity is happening at the smaller companies.

Perhaps one other reason Centa is successful is because it is an engineering company run by engineers. Arnott suggests that when it is possible, the company will always take the opportunity to buy into new projects that it finds interesting.

"I think that's one of the key features – we have a purpose in life and that's engineering," he concludes. "If it's new, it's exciting."

www.centa-uk.co.uk

SPS show drives innovation

The 2012 SPS/IPC Drives Show took place in Nuremburg in late November. Here, Paul Fanning looks at some of the new technologies to have emerged from it.

The SPS Drives Show, which took place in Nuremburg in late November, is probably the largest exhibition in the world dedicated to drives, controls and automation. For this reason, it tends to be where many of the world's leading drive and control manufacturers released new products to the market.

One of the standout releases at the show came from Control Techniques, which launched its Unidrive M range. Designed for customers in the manufacturing sector, each of this family of seven drives has been designed to meet the requirements of, and improve productivity in, a specific area of the manufacturing market.

The new top-range product, the Unidrive M800, integrates a new breed of high-performance MCi machine controller within the drive to enhance machine throughput by providing comprehensive control across complete customer machines. They are configured using the industry-leading CODESYS programming environment with standard IEC 61131-3 programming languages and standard Ethernet for communication across drives, I/O, HMIs, PLCs and other industrial devices. Control Techniques' synchronised multi-tasking structure and advanced motion control expertise complete the offering, fully utilising open and industry standard technologies.

Onboard real-time Ethernet (using IEEE 1588 V2) provides improved machine control with fast and flexible communications, achieving synchronisation rates across the network of below 1µs, update rates as low as 250µs and a virtually unlimited node count.

Control Techniques' advanced new Real Time Machine Control Protocol uses standard Ethernet TCP/IP and UDP to provide a highly efficient and compact message structure that frees up Ethernet network bandwidth and minimises network loading. This allows Unidrive M models to talk directly to each other instead of having to route all communications through the traditional machine controller. Each Ethernet-enabled drive incorporates a dual-port Ethernet switch with standard RJ45 connectors, greatly simplifying the task of networking machines.

Certain applications, such as electronic line shafts, can be set up without having to write any programming code at all. In these instances, the drives will start communicating with one another automatically, synchronising their control loops so that they can operate in seamless coordination. Standard Ethernet allows Control Techniques' protocols to work alongside others, such as PROFINET RT, Ethernet/IP and Modbus TCP/IP.

To create the Unidrive M family, Control Techniques conducted the most comprehensive programme of market research in its history. The goal of this research was to allow the company to develop an engineering plan that was entirely focused on customer needs. The initial programme of qualitative research consisted of a series of in-depth interviews with OEMs and other end users

B&R's new offerings at the show included ACOPOSmulti drive system

designed to identify the precise needs of the manufacturing market. This was followed up by a comprehensive programme of quantitative research which greatly expanded upon the findings of the interviews, ensuring that Control Techniques understood exactly which drive features each specific area of the manufacturing market requires. The quantitative research consisted of conjoint studies: sophisticated web-based surveys which recreate the buying decision in order to establish the underlying needs of the customer.

Another launch at the show came from Global AC drive manufacturer Vacon, which announced the new Vacon 100 FLOW, an AC drive specially optimised for pump and fan applications. The new AC drive offers versatile flow control for water & wastewater and building automation applications, further strengthening the wide range of the VACON 100 product family.

The Vacon 100 FLOW is the newest member of Vacon's third-generation VACON 100 product family. It combines the Vacon 100 HVAC AC drive for building automation applications with dedicated functions that can benefit flow control processes. The new AC drive also improves the efficiency and redundancy of pump systems, offering advanced features such as Multimaster and Multifollower for controlling multiple pumps simultaneously.

Vacon 100 FLOW comes with many user-friendly features such as a fully graphical multilingual display, configuration wizards which

UK-based Invertek used the show its Optidrive range of variable speed drives

enable easy setup of the drive, and intuitive built-in block programming functions which allow the AC drive to be tailored for special needs, such as use in retrofit installations.

Easy system integration is made possible with industry-leading on-board Ethernet-based communication protocols such as EtherNet/IP, PROFINET IO and Modbus TCP, a Safe Torque Off (STO) function and ATEX-certified motor over-temperature protection.

UK-based variable speed drives manufacturer, Invertek Drives used its largest exhibition stand to date at SPS/IPC/Drives to showcase a range of new technologies. Demonstrations of Optidrive HVAC delivering improved performance, control and energy saving in fan and pump applications were a major highlight, while Optiflow drive technology was used to run a large demonstration of the energy efficient-control of multiple pump sets without the need for an expensive PLC.

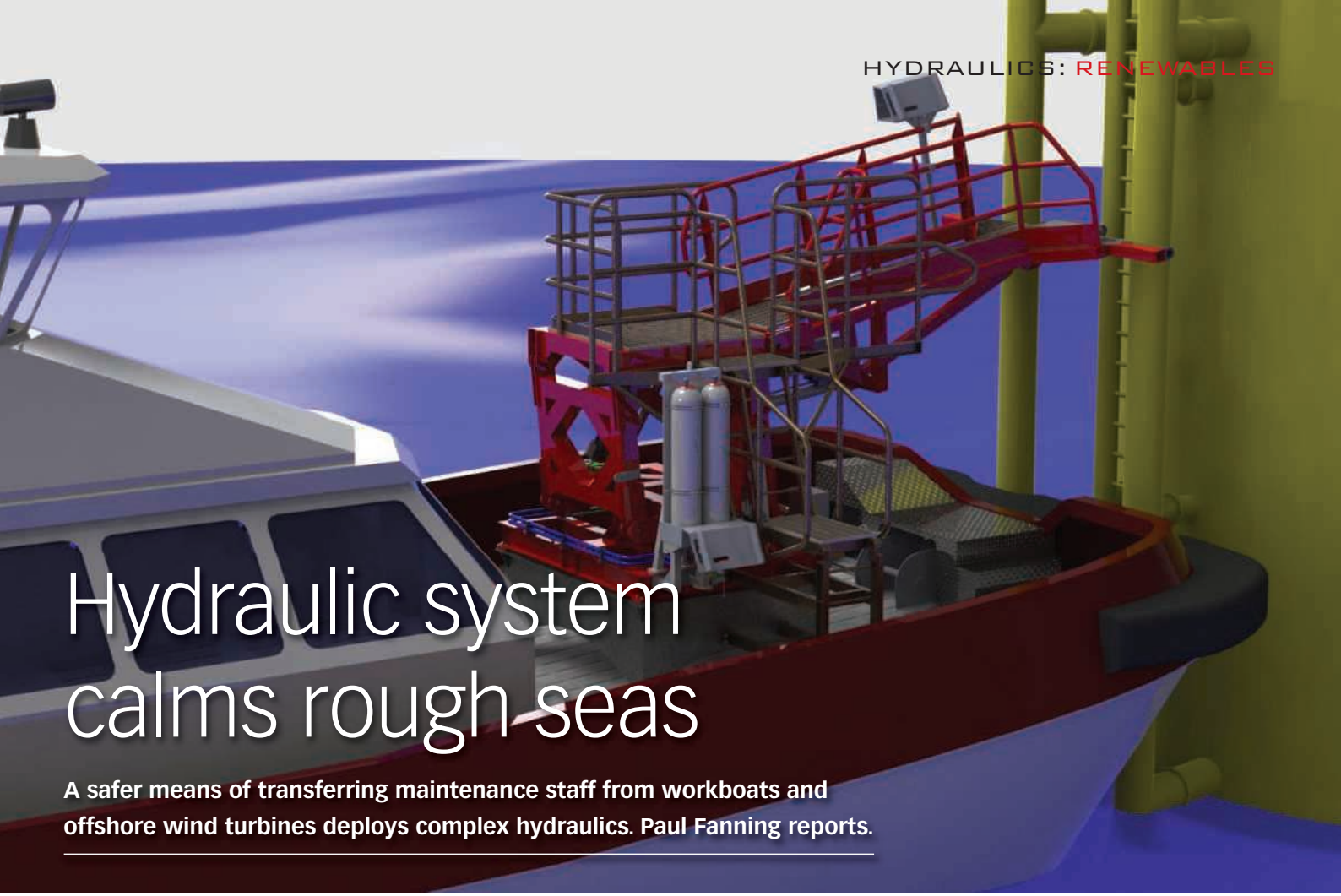
Alongside these Optidrive HVAC demonstrations was the newly-launched compact Optidrive Elevator, dedicated to geared and gearless lift systems; the high-performance Optidrive P2 range, providing world-class control for the latest generation of permanent magnet and standard induction motors; and the hugely successful Optidrive E2 general-purpose drive, offering cost-effective solutions for a huge range of applications. IP55 and IP66 rated enclosed Optidrives for arduous environments and washdown applications were also on display.

Also on show was the latest generation OptiTools Studio diagnostics and drive commissioning software. This software extends the usability and flexible performance of the Optidrive ranges by allowing extremely easy transfer and comparison of parameter sets, optional PLC programming capability, Bluetooth connectivity and a host of other performance-enhancing capabilities.

B&R's new offerings at the show included the ACOPOSmulti65m motor-mounted servo drive with IP65 protection is an innovative addition to B&R's modular ACOPOSmulti drive system. It melds with the motor to form a configurable and easy-to-connect mechatronic servo drive unit with integrated safe motion functions and openSAFETY to deliver power right where it is needed on the machine. This saves valuable space in the control cabinet, and even more importantly, advances the development of decentralised machine architectures.

In addition, B&R has introduced an all-new energy monitoring solution – APROL EnMon. Helping users implement ISO 50001, this new innovation also provides improved energy efficiency, which means reduced costs and increased competitiveness. In stand-alone operation or integrated in an existing APROL process control system, this solution supports a continual improvement by measuring and evaluating all relevant energy consumption data.

www.emersonindustrial.com
www.uk.vacon.com
www.invertek.co.uk
www.br-automation.com



Hydraulic system calms rough seas

A safer means of transferring maintenance staff from workboats and offshore wind turbines deploys complex hydraulics. Paul Fanning reports.

Erecting offshore wind turbines is one thing, but maintaining them in often rough seas is quite another. In offshore wind farm support, transferring engineers and technicians to and from the turbines for maintenance is vital. As wind turbines are installed further offshore, sea conditions become more extreme, reducing the availability to affect such transfers whilst maintaining safety. The subsequent increase in wind turbine downtime degrades the overall economics of building offshore wind farms.

The Turbine Access System (TAS), jointly developed by Houlder and BMT, is designed to address this problem. This system is designed to provide a safer means of offshore transfer between workboats and offshore wind turbine structures. Developed with BMT Nigel Gee, it operates via a motion-compensated gangway that, once raised into place, maintains a fixed transfer position in comparison to the wind turbine structures, providing personnel with a secure point from which to transfer.

The TAS does not require any dynamic positioning and at no point attempts to actually fix or connect to the turbine structure, thus mitigating any risk of damage to its outer surface. It also serves as an important safety measure as, if a problem occurs, the system and boat are free to move away immediately.

The mechanical structure consists of a gangway mounted on a hydraulically-articulated base. The gangway is attached to the base such that it can move up and down (pitch cylinder) whilst the base moves forward/back (surge cylinder) and port/starboard (roll cylinder). These three hydraulic cylinders compensate for boat motions in roll, pitch and heave. There is no need to compensate for any other boat motions, since the boat remains in contact with the turbine tower by thrusting at the tower base.

With most alternative transfer systems limited to operating in wave heights of up to 1.5m, the TAS is designed to increase operability to 2.0m resulting in significantly higher cost efficiency. The predicted total savings of utilising a system to improve operability are calculated at just below 200,000 per year. In terms of installation, the TAS does not require a large vessel to support it, in fact, it can be used on smaller workboats ranging from just 18m in length.

The control system component of the TAS relies on a control algorithm runs on a National Instruments CompactRIO embedded controller, which processes the boat motions measured by a Motion Reference Unit (MRU) sensor and performs active heave, pitch and roll compensation through the adjustment of hydraulic actuators.

The Motion Reference Unit (MRU) measures the motion of the vessel and transmits data for positions and angles via a serial data link to the main processing unit. The MRU itself is a complex device and required careful selection and configuration to ensure suitable performance.

Houlder and BMT Nigel Gee have recently announced that the TAS has been awarded additional funding by the Carbon Trust under the Offshore Wind Accelerator – Access programme. The additional backing will be used to develop an integrated bow roller mechanism to further enhance its operability as a safe, reliable and predictable transfer platform.

The hydraulically-damped rollers will allow the vessel to push up to the boat landing on the turbine foundation structure in the conventional manner and the integral damping system will reduce and control the vessel motion thereby eliminating the sudden movements of the vessel which can occur with conventional fender systems. The development of the integrated bow roller unit will also enable shipbuilders to install TAS rapidly for both new build and retrofit Windfarm Support Vessels.

www.houlderltd.com
http://uk.ni.com/

Hydraulics meet exacting demands

Hydraulic systems are well-suited to demanding applications and environments. Here, Paul Fanning looks at some of the components that make this possible.

In many instances, hydraulics are more reliable than mechanical systems in extreme environments. Their relative simplicity and consequent reliability means that, if nothing else, there is less to go wrong in hydraulic systems than in their mechanical counterparts and, while there may be a consequent trade off in terms of efficiency, this reliable and predictable performance from hydraulic components and systems under adverse conditions gives them a distinct advantage.

One example can be seen in Parker Hannifin's 160 bar and 250 bar hydraulic 'mill' cylinders, which are an established global favourite in hostile environments and arduous applications. As their name suggests, they were originally designed for use in steel mills and are of heavy duty, all-steel construction and are fatigue-free at their maximum rated pressure.

The latest generation of these cylinders extends the standard fitment of induction hardened piston rods, offering the ultimate resistance to damage in tough applications. A new, wider range of mounting accessories offers greater versatility for the designer, while web-based CAD models and an on-line configurator speed and simplify the selection process.

Mill cylinders can be used at operating temperatures of between -20ºC and +150ºC and generate up to a massive 2000kN, making them the ideal choice for high force applications in the toughest conditions.

Another example of hydraulic components being well-suited to harsh operating conditions can be found instances where liquids need to be pumped at high temperatures. This can cause problems for pumps designed to operate at ambient temperatures and reliant on close tolerances for operational efficiency. Differential thermal expansion can also cause fit problems with bearings, bushes and dynamic seals.

Hydra-Cell pumps from Wanner are designed not to suffer from such problems and to handle liquid temperatures as high as 120°C with ease. This is possible because their multi-diaphragm design has no dynamic seals and incorporates neither tight fits nor close tolerances.

The increased corrosivity of hot liquids is a further problem encountered (water at 90°C is 64 times as corrosive as water at 20°C.) Corrosion of pump internals, including gears, screws, rotors, stators, impellors, bearings, bushes, pins and seals impairs operation, causes leaks and can lead to catastrophic failure. However, in a Hydra-Cell pump there are no dynamic seals and no bearings or bushes, operating within the pumped liquid, to be affected by thermal expansion or corrosion. The liquid is always isolated from the drive end of the pump and the selection of appropriate pump head material ensures that corrosion is not a problem.

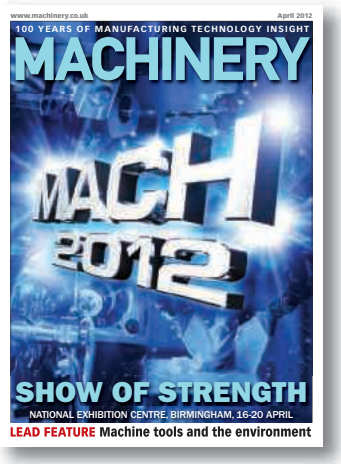
High pressure, of course, places strain on all aspects of a hydraulic system, including hoses. And, with today's hydraulic systems requiring ever-higher flow rates, increased working pressures and performance, the hose needs to be able to keep up. Eaton's new Dynamax EC850 hose and fitting series is designed for working pressures up to 500 bar (7,250 psi).

With a bend radius 10% better than the SAE100R15 industry standard, the hose is also extremely flexible which enables the end user to easily install the hose assembly in tight areas. The Dynamax EC850 was also designed with a new generation of inner tube material that enables it to achieve significantly increased service life while meeting the REACH regulation.

www.parker.com
www.hydra-cell.eu
www.eaton.com

Inspired by innovation

www.findlay.co.uk



Passionate about engineering

Increasing the understanding of IP

Eureka has partnered with leading intellectual property law firm D Young & Co LLP to offer guidance on how to protect IP. Here, D Young partner Anthony Albutt (pictured) looks at some of the issues that have arisen in 2012.

We hope that this year's series of intellectual property-related articles has provided readers with some helpful information about the rights available to them and how they can be used. The series has certainly stimulated an interesting debate and we hope that at least some of the fog surrounding IP rights has cleared.

Thank you again to all of the readers who participated in the recent online survey about IP rights. For those interested, the most common questions and concerns raised in the survey are addressed at www.dyoung.co.uk.

As we have tried to stress throughout our series, intellectual property is a valuable part of any company's worth. Like buildings, machines and stock, the ideas your business creates and uses are key components of your commercial success. If you have a good product, service or idea (and one from which you are making money) there is every chance that someone, somewhere will want to copy you and enjoy the same commercial success that you enjoy.

Intellectual property rights are a means for companies to protect those ideas and ultimately to protect their business. In some cases they can provide a surprising source of alternative income in the form of licensing. Love them or hate them they are a part of just about every industrial country's laws.

Over the course of the series, many readers raised concerns about complexity and cost of protecting their technology, this being particularly so for small businesses. There is no doubt that protecting intellectual property can be complex and, if handled without a commercial perspective, it can also be expensive. However, there are many ways costs can be minimised. Be strategic in the way to protect your technology and at all times bear in mind the commercial realities of your business and your competitors.

Think about the following questions:

What aspects of your business/products give you a commercial advantage?

Why do customers use your services or buy your products?

Is it your brand? Is it your reputation? Is it your technology?

Where do you need to protect yourself?

These questions provide the foundation of an IP strategy. You can then work out how best to protect your business applying the appropriate rights at the appropriate time and in the most cost effective manner. There are many ways to protect your intellectual property and it need not cost as much as you might think.

Another important aspect we've touched on this year is the Patent Box. For any readers who are struggling to get any interest from management, try reminding them of this: The Patent Box will reduce corporation tax for WORLDWIDE sales of patented products. A different strategy for patenting is required. Normally we write patent applications to ring-fence technology, meaning we try to make the scope broad. For patent applications for the Patent Box, we can seek a narrow scope covering the specific product. This minimises the cost of obtaining the patent, reduces the chances of the patent being challenged and optimises your chances of benefitting from the generous corporation tax relief available from 1 April 2013.

A question that arose frequently over the year was that of access to patent information. A complete list of useful links is available at http://www.dyoung.com/internet-links. Of particular relevance is a database called 'espacenet' which gives you keyword, subject and title searches to millions and millions of patents and patent applications. If you need help please contact your patent attorney or Anthony Albutt, D Young & Co (aja@dyoung.co.uk).

We hope that some of the strategic issues raised over the year have helped companies to understand what IP can and cannot do for them. More information is available in the form of an online webinar covering aspects of IP strategy at www.dyoung.com/events.

Moving into 2013, *Eureka* will continue to work in collaboration with D Young & Co to expand the IP series and to provide a deeper insight into aspects of intellectual property, including some case studies which we hope will help UK companies understand IP protection.

All that remains is for the attorneys, solicitors and support staff of D Young & Co to wish you all a very Merry Christmas and a very prosperous, efficient and productive New Year.

For more information, please contact Anthony Albutt, Partner, on:
Tel: 020 7269 8550
Email: aja@dyoung.co.uk www.dyoung.com

D YOUNG & CO INTELLECTUAL PROPERTY

WG Jones Ltd

Quality Engineer

Location: Verwood, Dorset Type: Permanent
Salary: Dependent on experience

JOB DETAILS: WG Jones Ltd now requires a Quality Engineer.

The successful applicants will have experience in the Aerospace Precision Engineering environment. Competence in AS9100 is essential.

Experience in problem-solving, process improvement & SC21 would be beneficial.

The position offers five weeks' holiday, Sickness Scheme and Pension.

For full details online, enter reference: QualEng011212

Design & Development Engineer/Project Engineer

Location: Scunthorpe
Type: Contract/Interim
Salary: £17ph-24ph

This established, leading UK manufacturer of physical security products is a designer of intricate fabrication concepts for products such as anti-vandal screens, strongroom cages & cabinets, electronic racking, steel doors & security access for commercial & industrial applications. Due to extensive business growth, it is keen to expand its team with the appointment of another 1-2 Contract Design Engineer or Design & Development Engineer or Project Engineer (design biased) for a 6-month contract (minimum), due to heavy workloads and new incoming work orders.
As Design Engineer, you must have prior experience with handling various projects and good hands-on skills with SolidWorks 3D CAD software. You will have prior experience within a role such as Design Engineer, Design & Development Engineer or Project Engineer.

For full details online, enter reference: DesDevEng011212

Design Engineer – Hydraulics

Location: Southam, Warwickshire
Type: Permanent
Salary: £20k-£25k per annum, plus benefits

This highly successful and dynamic manufacturer of Hydraulic Valve and Manifold Systems for numerous applications is looking to recruit a number of experienced Design Engineers, with exposure to the Hydraulics Industry.

The role will be liaising with clients and designing manifolds for a variety of industries. Using the tools provided, namely: SolidWorks, DraftSight, Sage 200 and Microsoft Office. You will be selecting the materials required, preparing concept drawings and production drawings.

Key Responsibilities for the role include:-

- Liaising with customers and internal staff to obtain technical details and specification
- Designing whole or part Hydraulic Manifold systems
- Preparing concept drawings
- Selecting materials and components required
- Liaising with existing suppliers and place enquiries
- Preparing job costing and presenting these in spreadsheets.

For full details online, enter reference: DesEng011212

Senior Power Supply Design Engineer

Location: Surrey/West Sussex Type: Permanent
Salary: £40k-£50k per annum, plus benefits

Excellent opportunity for an experienced Senior Power Supply Design Engineer to join a leading designer and manufacturer of electronic power systems, principally for various markets.

As a Senior Switch Mode Power Supply Design Engineer, your responsibilities will be:

- **To design and develop new LV and HV units from concept to production**
- **To support team members and other engineers in the development of new and existing products.**

Requirements for the role will ideally include:

- **Degree/ HNC in Electronic Engineering or related subjects**
- **Considerable amount of experience in designing and developing LV and HV power supply units Experience working on Switch mode Power Supply Units**
- **General Power Supply experience**
- **Familiarity with analogue circuit design especially switch mode PSUs.**

For full details online, enter reference: SnrPowEng011212

Materials Engineer/ Analyst

Location: Derby Type: Contract/Interim
Salary: Negotiable

Role description (to include):

- Resolving technical queries, in respect of materials performance in a railway environment. The vast majority of queries relate to polymers, rubbers, adhesives, sealants and paints that are used on railway vehicles
- Working with design engineers and system engineers to identify the most appropriate material for a given application (identifying suitable materials from Bombardier's Preferred Materials List, where possible)
- Evaluating and contrasting material properties of materials, in order to determine feasibility or acceptability of a material substitution.

Requirements to include:

- Materials degree and/or significant experience with materials engineering (particularly polymers, rubbers, adhesives, sealants, paints)
- Will consider various levels of experience, but must have a materials engineering background
- Intermediate/Advanced Microsoft Word and Excel skills.

For full details online, enter reference: MatEng011212

Design Verification Engineer

Location: Aberdeen
Type: Permanent
Salary: £70k-£75k per annum

JOB DETAILS: This well-known service company is looking for a dynamic design Verification Engineer to join its Aberdeen operations.
The ideal candidate will have experience of subsea and come from either a mechanical or electronic background.

The Role:

- Be experienced of the following Engineering Specs/Standards: API 6A/16A/17D, ASME IIIV, PD5500
- Have knowledge of offshore legislation, including DCR & PFEER Regulations
- Honours Degree in Mechanical Engineering (or similar)
- Significant experience in a design engineering role in a similar industry will be an advantage.

Qualifications:

- Bachelors Degree Hons or equivalent.

For full details online, enter reference: DesVer011212

Mechanical Engineering Manager

Location: Cramlington; Nationwide Type: Permanent
Salary: £55k per annum, plus benefits

A world leader in the design and manufacture of products for pipeline inspection is seeking a Mechanical Engineering Manager and a Mechanical Engineer.

Technical skills are clearly vital for this role, but, as it has a fantastic working environment, team fit and character will play a large part in the selection process.

This role will be responsible for leading the Mechanical Design Team located in the UK and Germany, plus contract Engineer/Designer resources, managing day-to-day technical aspects of the team and driving development of inspection products, which will be used in the inspection of gas and oil pipelines.

Required: Mechanical Engineering degree BSC or equivalent minimum. Also, 10+ years' experience in the design and development of complex electro mechanical equipment.

For full details online, enter reference: MecEngMan011212

Principal Engineer - Body Development and Materials

Location: Warwickshire, West Midlands Type: Permanent
Salary: £50k per annum, plus benefits

Leading automotive OEM, with recent substantial growth and development, is seeking a Principal Engineer, responsible for engineering targets, processes, design verification planning and execution for all body engineering and body materials physical test sign-off.

Key responsibilities and tasks to include:

- Assess and continually improve the body materials & development processes. In particular to lead the development of a process to take design aspirations and make them into real, robust product offers
- Lead a team of engineers in the execution of these processes
- Lead the development of body engineering joining technologies

Requirements to include:

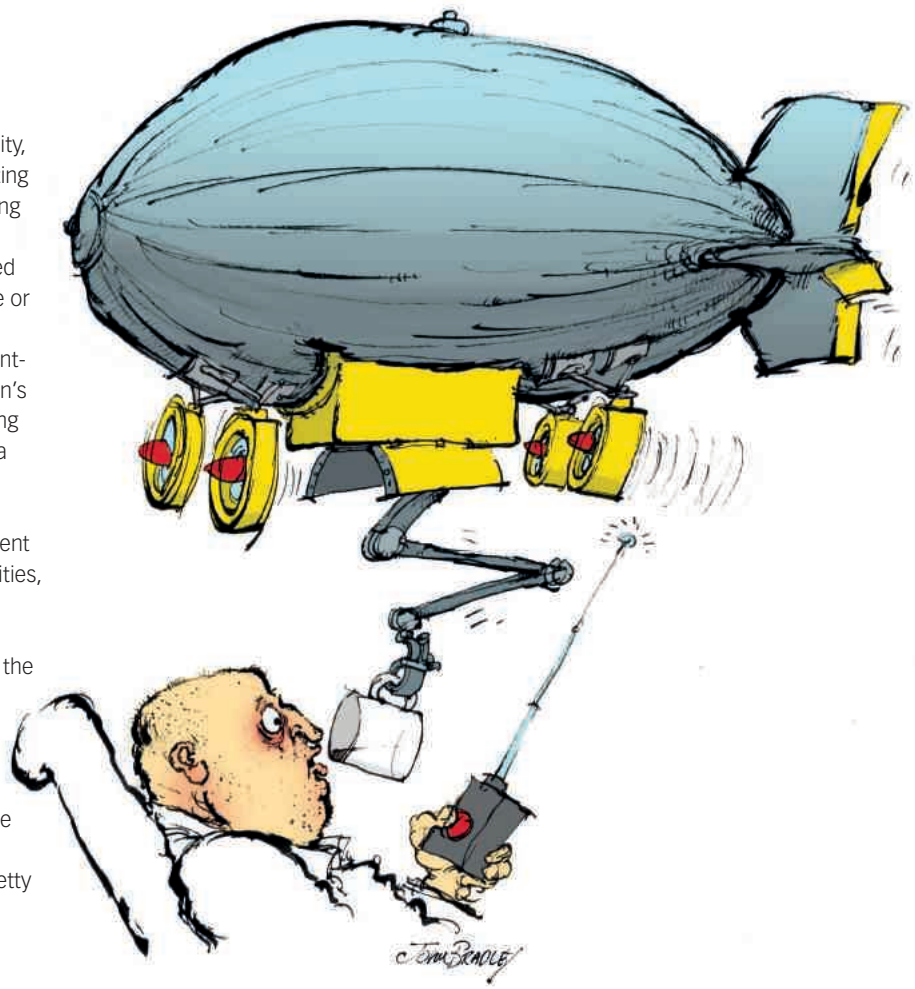
- Extensive experience in product engineering with emphasis on the development of new materials technology and materials testing
- Engineering degree, preferably in an automotive subject.

For full details online, enter reference: PrinEng011212

For more information on the following jobs enter the reference No. on...
www.totallyengineeringjobs.co.uk/jobs/eu

A helping hand

Certain disabilities make eating and drinking difficult. Can a simple, effective and affordable solution be found?



For the millions of people worldwide living with a disability, even simple tasks such as eating and drinking can be a nerve-wracking and socially awkward experience.

While many of us take for granted indulging in an early morning coffee or dinner with family and friends, for people living with chronic, movement-related conditions such as Parkinson's disease, these tasks can be both long and arduous or require the help of a carer or family member.

A number of assistive robotic devices that blend sensing, movement and information processing capabilities, are currently on the market - all of which aim to promote independent living and improve quality of life for the user and the user's family.

While they can be effective, these systems still have some way to go before they are readily available to the masses. Not only are they bulky in size and not exactly discreet, they often come with a pretty hefty price tag.

The Challenge

The challenge this month, then, is to come up with a solution that helps people who have chronic or degenerative impairment in motor, sensory and/or cognitive abilities, to eat or drink more easily and more autonomously.

The device, which could also benefit the elderly, must be highly discrete to ensure people's dignity is maintained, and work to reduce spillages and waste. Fundamentally, it must be something of real practical benefit. Cost is also a key factor.

The solution is simple, elegant, relatively inexpensive (less than £50) and uses off-the-shelf technology. It blends advanced materials, adhesives and high-tech bearings, all of which have been assembled with elegance.

When you see the device you may consider it obvious, but in the meantime, see if you can come up with something better.

The solution to last month's Coffee Time Challenge of how to produce more flexible batteries can be found in the Technology briefs section on page 12

Adhesives

www.loctite.co.uk

Non Hazardous Engineering Adhesives

... same high performance with no price premium

Protecting our workforce and environment through ever tightening health and safety rules has a double edge. Of course it's in everyone's interests but for those whose job it is to evaluate the suitability of hazard-labelled products against process needs and company policy, tougher legislation means a lot more work. The quick fix is to select products that are free from hazard labelling. But in reality, are they as effective as their counterparts whose constituents require them to display health and safety symbols? In the case of the health and safety range from Henkel, the answer is a resounding yes. The company first introduced its Loctite 2400 and 2700 threadlocking products a short time ago but now these formulations have been joined by others with similar credentials. As a result, Henkel is unique in its ability to offer a comprehensive range of hazard-label-free engineering adhesives that cover the lion's share of applications.

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

Coatings

www.ws2.co.uk

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

Hot Air

www.welwyntoolgroup.co.uk

Human Machine Interfaces

www.eao.com

Smallest digital output hall-effect joystick only 33mm square

The new compact Grayhill Series 67A Joystick, a Hall-Effect joystick with a built in micro-controller for I2C interface is now available in the UK from EAO - the expert partner for Human Machine Interfaces.

I2C is a simple and flexible interface bus for communication with other digital devices. More common in larger joysticks, Series 67A is the first to offer digital output from a joystick with a 28mm tall bat-handle, requiring just 18mm of behind panel depth. A hall-effect sensor provides contactless operation, facilitating a long operational life of over 1 million cycles. The hall-effect sensor magnetically detects the shaft position anywhere within its 20-degree field of travel. The on-board micro-controller then produces X,Y coordinates in a range from 0 at center to 80 at the extreme periphery for digital output. It also conserves power by operating at 3mA max, with a built-in sleep mode of only 0.1mA max.

@: sales.euk@eao.com
✆: 01444 236000

Inserts

www.spirol.com

Spirol Inserts for Plastics Solve Ski Industry Product Failure Problem

To fasten a map rack to the safety bar of a ski lift, a thread cutting screw was being used in the assembly process. The application required seasonal removal and the repeated cycle of installation/removal was resulting in failure of the plastic boss. Spirol Industries recommended an alternative solution that included the use of a reusable thread rather than thread cutting screws that are only intended to be used once.

The component host material was HDPE, high density polyethylene plastic. This material retains good flexibility and impact resistance in cold weather, but is prone to creep - a material's tendency to move opposite the direction of induced stress until that stress is relieved. For this reason, much of the retention achieved when directly threading a fastener into this material is lost over time.

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

Pumping Polyols and Isocyanates

www.hydra-cell.eu

Pump Excels in Polyurethane Production

Wanner International has introduced a range of Hydra-Cell multiple diaphragm pumps that it has developed to meet the specific needs of polyurethane production. Isocyanates, when exposed to air, tend to form crystals that generate premature wear in pumps with dynamic seals while Polyols, especially those containing abrasive fillers, are equally as destructive to seals and bearings. The Hydra-Cell multi-diaphragm pump has no dynamic seals and consequently handles abrasive particles with ease, significantly reducing maintenance costs. Now with new PTFE diaphragms, chemical compatibility and service life are no longer concerns. Hydra-Cell pumps with these new diaphragms have been tested extensively and shown to be able to operate reliably at full flow under flooded suction conditions.

@: NHerrington@wannerint.com
✆: +44 (0)1252 816847

Rapid Prototyping

www.laserlines.co.uk

Black ULTEM 9085

Now build FDM parts in strong, FST-rated black material

UK distributor Laser Lines Ltd, is pleased to introduce ULTEM 9085 material in black for use on the Stratasys Fortus 900mc and 400mc 3D Production Systems.

If you rely on ULTEM 9085 for its flame, smoke and toxicity (FST) rating and impressive mechanical properties, your Fortus® 900mc or 400mc can now build all of the same ULTEM tools, prototypes and end-use parts in a uniform black colour.

@: markt@laserlines.co.uk
✆: +44 (0)1295 672515

Switches

www.hirschmann.com

Belden Unveils HiOS – A New Operating System Generation for Its Hirschmann Brand of Switches

The new HiOS operating system from Belden for its Hirschmann brand industrial ethernet managed switches used in the automation sector further extends the range of applications for such switches.

It permits the use of intelligent infrastructures in time-critical applications, previously exclusively a 'hard-wired' domain, i.e. with point-to-point connections.

In a transformer substation scenario, for example, this allows sensors and controllers to be securely connected to the network via Ethernet. In addition to numerous management and diagnostic options, it provides precise time synchronization compliant with IEEE 1588v2 plus a variety of redundancy protocols.

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