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In this issue: PLM Round Table • Drives, Controls & Automation • Rapid Product Development

A WINNING HAND

British prosthetics
lead the world



MEDICAL SPECIAL REPORT

2011 - a good year for CAD



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10-Nov-10	Shepherd Neame	Faversham
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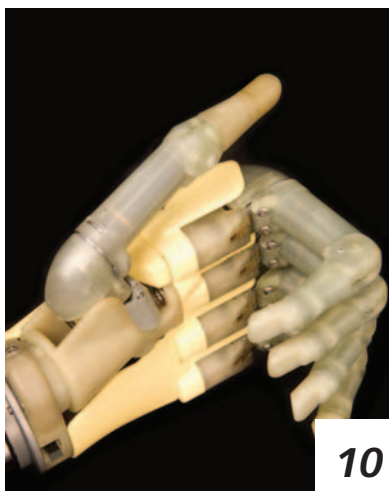
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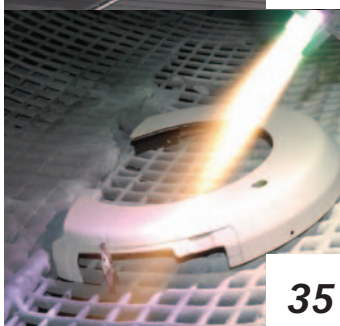
18



20



31



35

- 10 Cover Story: British bionics play a winning hand**
Paul Fanning reports on a Scottish company leading the world in the field of bionic prosthetics.
- 15 Anti-terror system finds cancers**
Tom Shelley reports on the adaptation of a technology used to find weapons to identifying breast cancer.
- 16 Systems care, entertain and protect**
Tom Shelley reports on what can now be done with bedside electronics without risking infection.
- 18 Interview: Andrew Reynolds-Smith**
Can UK manufacturing rebalance the economy? Can the skills gap be closed? And, more importantly, how? Paul Fanning asks Andrew Reynolds-Smith of GKN.
- 20 PLM Round Table**
Negative perceptions of Product Lifecycle Management and how to change them was the major theme to emerge from the recent Eureka PLM Round Table.
- 23 Computing aids advance rapid development**
Tom Shelley reports on technologies to aid brainstorming and getting products to market faster, especially in the challenging field of alternative energy.
- 25 Rapid prototyping 'shows its metal'**
Tom Shelley reports on advances in rapid prototyping, including the manufacture of more efficient heat exchangers and hydraulic manifolds.
- 27 White light leaps forward**
A UK company has developed a technology that could revolutionise 3D scanning. Paul Fanning reports.
- 28 Sensors, Test & Measurement in brief**
- 31 Fast components take the heat**
Tom Shelley reports on high efficiency automation actuators and motors for hot places.
- 35 Hot coatings for composites**
Tom Shelley reports on coatings that can protect composites against intense heat and provide other beneficial properties.
- 36 Ceramics give extra strength**
A construction that allows ceramics to withstand impacts.
- 39 TCT showcases rapid manufacturing**
Eureka previews this year's TCT exhibition.

- 5 Comment**
The future's bright
- 7 News**
Industry figures warn of severe skills shortages
- Smart textiles could power consumer devices
- 9 Technology Briefs**
NI releases high-performance drives and motors
- Six into one with Power Cube
- Drive upgraded for motion control
- 43 60 Second Interview**
Dr Patrick Finlay, managing director of MediMaton, talks to Eureka
- 44 Coffee Time Challenge**
The challenge this month is how to make a device for retrieving scattered objects.

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ISSN-0261-2097

Eureka (incorporating Engineering Materials and Design and Design News) is free to individuals who fulfil the publisher's criteria. Annual subscriptions are £78 UK (£115 overseas or £150 airmail).

If you change jobs or your company moves to a new location, please contact circulation@findlay.co.uk to continue receiving your free copy of Eureka.

Origination
CTT

Printed in England by
Wyndeham Heron Ltd

©2010 Findlay Media Ltd,



Published by
Findlay Media,
Hawley Mill, Hawley Road,
Dartford, Kent, DA2 7TJ
Tel: 01322 221144
www.eurekamagazine.co.uk



The future's bright



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

Among the many highlights of NI Week in Austin, Texas last month was a keynote address given by Professor Michio Kaku, the American theoretical physicist familiar to many from his books and numerous appearances on television.

The talk he gave looked at current and future trends in science and engineering, covering areas as diverse as potential advances in medicine, embedded electronics, augmented reality and nanotechnology. Indeed, it would be impossible to try and do justice to such a wide-ranging discussion in such a limited space. Suffice to say that it painted a picture of a near future in which technology would be so ubiquitous and sophisticated that it will change and (for the most part) hugely improve every aspect of our daily lives.

Thus, in the future, preventative medicine will be built into our daily lives. Our mirrors will diagnose potential medical complaints and nanobots will attack cancer cells.

Perhaps the most heartening news, however, is that the future is bright for engineers. His analysis was that, while robots will perform the repetitive and analytical tasks of the future, they won't replace the jobs requiring creativity and pattern recognition. Thus, according to Professor Kaku, engineers will be absolutely critical players in the future.

Of course, we knew that there is no substitute for the invention and creativity of human engineers. However, it is good to hear it confirmed by such an illustrious source.



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Industry figures highlight severe skills shortages

Warnings are emerging from industry that the urgent need for engineers is not being helped by too few young people taking an interest in STEM subjects.

A survey of 2,000 A level and university students by Centrica has revealed that 55% would not consider a career in science, technology or energy. Media and entertainment jobs were more desirable, the study showed.

Similarly, a total of 17,442 A-level students sat technology exams in 2009-10, compared to 33,822 people taking media, film or TV studies, figures published by the Joint Council for Qualifications showed. While there was an increase in the number

of pupils taking technology, maths and the three sciences compared to last year, Sir James Dyson warned there was still a long way to go to satisfy business demand.

Sir James said: "I'm encouraged to see an increase in the number of students with strong science, engineering, technology and mathematics A-levels. But we need to boost these numbers. For the UK to stay competitive, we require the right people with the right training."

The shortage of skills has been brought into sharp focus by Dyson's drive to recruit 350 engineers. Despite more than 4,000 applications having been received, only 100 of the places have so far been filled.

The warning comes as a third of engineering companies said they doubted they would be able to recruit enough suitably qualified professionals to meet their business needs, according to the Institution of Engineering and Technology (IET).

According to the IET, approximately 20% of science-related professional jobs in the UK were filled by migrant workers: a sign that the skills gap could become 'unmanageable'.



Smart textiles could power consumer devices

Scientists at the University of Southampton are developing technology that may enable people to power MP3 players and other devices through their clothes they wear and the carpets they walk on.

Dr Steve Beeby and his team at the University's School of Electronics and Computer Science aim to generate energy through people's movement, eliminating the need to change batteries on devices.

In a project funded by the Engineering and Physical Sciences Research Council, the

Southampton team will use rapid printing processes and active printed inks to create an energy harvesting film in textiles. This film can also be printed on carpets, enabling individuals to generate energy as they walk around the home or office.

"This project looks at generating electrical power from the way people move and then applying an energy harvesting film to the clothes they wear or the materials they have around them," says Dr Beeby. "We will generate useful levels of power which will be harvested through

the films in the textiles. The two big challenges in smart textiles are supplying power and surviving washing."

The research, which begins in October and runs until 2015, will provide a toolbox of materials and processes suitable for a range of different fabrics that will enable users to develop the energy harvesting fabric best suited to their requirements.

Applications for the research include using the energy to power wireless health monitoring systems, as well as consumer products such as MP3 players.

Briefs

BRITISH SCHOOL TRIUMPHS

A British team came first and an Irish second in a European competition to design and build a space probe that could conduct useful experiments and fit inside a 350ml soft drink can. The 'CanSat' competition was organised by ESA's education office and the Norwegian centre for space related education. Five Intruder rockets launched 11 CanSats from Skarsteindalen, a former military facility close to the Andøya Rocket Range, each reaching a height of 1km before parachuting the payloads back to earth.

The gold award winners were 'Team Eclipse' from St Paul's School in London, whose CanSat produced a wind profile of its descent to facilitate the accurate placement of the drop of a hypothetical second payload.

STUDENTS WITH DRIVE

ACAL Technology is co-sponsoring a group of students to design, build and race prototypes of an electric and a hybrid car based on the Citroën 2CV chassis. A team of 31 post graduate students, from Group T, Leuven Engineering College and Antwerp Karel de Grote University College, will race the two converted 2CVs in the 'Experimental' class of the 24hour, 24H24 race on the Francorchamps circuit, Belgium, in October 2010.

The CQS Group T Racing Team approached ACAL for help with designing the electrical interface from the cars' batteries to the drive-trains and to the electronics used for the telemetry and wireless communication with the pit team. In the electric-drive Odyssey car, this included converting a 400V input into an output voltage of 12V at 600W and a further conversion of the 12V supply to outputs of 15 and 5V.

RANGE ADDS LOW-COST ENCODER

Miniature power transmission specialist Rotalink has added an innovative low-cost absolute encoder to its motion control range. For use with Rotalink's ovoid style gearboxes, the compact encoder is fitted directly on the rear side of output shaft to measure the load position and is available for single-turn 360° rotation or in a multi-turn version for up to 32000 revolutions. Using long-life and highly reliable non-contacting magnetic technology, the absolute encoder provides a choice of 0-5V linear analogue output or a 10-bit per 360° positional data via a synchronous serial interface (SSI).

The new device may be useful to replace potentiometer based angle encoders by combining motor and position feedback in a single component or for low cost servo feedback in linear and rotary actuators. Absolute position feedback is also extremely useful for machine homing. The innovative multi-turn option includes an integral rechargeable battery that maintains full position information for up to 20 hours if machine power is removed.

www.rotalink.com

FASTENER FAMILY EXTENDS

The family of Atlas Plus+Tite blind threaded steel inserts has expanded with a newly introduced version featuring a straight shank design. This fastener joins Plus+Tite pre-bulbed inserts in offering superior pullout resistance when installed permanently in plastics or thin sheet metal. Both types provide reliable and reusable threads for 'blind' attachment applications, including tubing and extrusion. A single mating screw completes the final attachment process.

www.pemnet.com

NI releases high-performance drives and motors

National Instruments has released AKD Servo Drives and AKM Servo Motors that are said to make it possible for engineers and scientists to build scalable, distributed motion control systems.

The AKM brushless servo motors provide superior dynamic performance, which are available in four different frame sizes, feature high torque, density and speed ranges. The motors use low-inertia rotors and feature low-cog, low-harmonic distortion magnetic design.

The motors are matched with NI servo drives and provide plug-and-play configuration with integrated Smart Feedback Device (SFD) technology and simplified cabling.

The AKD Servo Drives feature simplified setup and configuration through EtherCAT technology and



integration with the LabVIEW project, a feature in LabVIEW software that engineers use to group together LabVIEW and third-party files, create build specifications for executables and deploy or download files to hardware targets. The new drives deliver cutting-edge technology and performance with torque

loop updates in 0.67 s, and velocity and position loops at 62.5 s and 125 s. The AKD Servo Drives provide a solution for a wide range of applications, from basic torque-and-velocity applications to indexing to multi-axis programmable motion, using graphical system design.

www.ni.com

Solution to last month's Coffee Time Challenge

The 'LiftMate Patient Handler' has been developed by Personal Lifting and consists of an array of inflatable compliant sleeves covering rigid hollow tines. The array is brought up to the side of the patient and the sleeves then inflated so that they push underneath the patient. They inflate and curve upwards, in a similar manner, according to director Dr. Patrick Finlay, to the fingers of an inflated rubber glove. As the fingers inflate, the array of tines is inserted to give rigidity.



The patient may then be moved on the array of inflated sleeves. If the patient is to be sat, the array can be turned into a sitting shape, the array moved over the surface of a chair, and the tines removed and the sleeves deflated, to leave the patient sitting in the chair.

Dr. Finlay was previously project manager of the Medical Robotics initiative of the International Advanced Robotics Programme and is managing director of MediMaton. Co-directors of Personal Lifting are Steve Sandland and Lucius Cary. The Liftmate is protected by three patent applications.

www.medimaton.com

www.nsf.gov/eng/roboticsorg

Six into one with Power Cube

Ideally suited for controlling multiple submersible pumps in borehole and similar applications, the innovative Power Cube from Ralspeed replaces up to six ordinary control panels. Available in two sizes covering 1 to 15kW and 15 to 60kW respectively, it houses four soft starters, a distribution panel and an ultrasonic/GSM panel in a robust IP65 enclosure with a rain canopy and a rigid mounting frame. Not only does this greatly reduce the amount of wiring needed on site, it also minimises the time it takes to get pump control systems up and running.



The Power Cube offers a wide range of control options. It can be used with ultrasonic or float switch level controllers, and it can be configured for the pumps to run completely independently, or in any combination for duty/standby operation. An intelligent relay is also provided, which makes it easy to cater for special control requirements.

www.ralspeed.com

Drive upgraded for motion control

Parker Hannifin has increased the flexibility and capability of its AC890 Modular Systems and AC890PX High Power Systems AC drives with the launch of high resolution analogue input and encoder option boards. These option boards provide the extra inputs and outputs required in the likes of electronic line shaft applications, machine tools, and other demanding motion control tasks.

The 8903-EP encoder option board features an incremental encoder input for a reference encoder, and a synthetic encoder output. The encoder input provides optically isolated differential inputs on channels A, B and Z. All inputs are compatible with RS422 and RS485 encoders, as well as encoders that provide output voltages as high as $\pm 30V$. The board embeds all the decoding logic required to interface the encoder input to the drive's microprocessor, providing true 'plug and play' connectivity. Three non-isolated differential digital outputs are used for synthesising an encoder output.

www.parker.com



Slewing rings stay tough

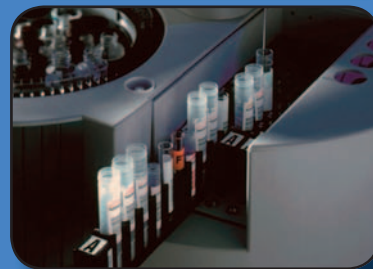
Polymer slewing rings from igus are ready-to-fit solutions that require no lubrication or maintenance. Designed to replace ball-bearing type rotary tables or systems, the parts can be used in a variety of applications, usually pivoting. Tough, yet lightweight, iglidur PRT slewing ring bearings are corrosion-free and the sliding parts are made of the tribo-optimised special material iglidur J.

The design of the slewing rings exploits the advantages of the tried and trusted iglidur polymer plain bearing range. All the housing parts are made of aluminium (316 stainless steel versions are also available), the iglidur sliding parts run on hard anodised aluminium, and all connecting screws are made of stainless steel.

Manual clamp, drive plate and spacer rings are available as accessories. In addition, special solutions are available ex-stock, such as FDA-compliant slewing ring bearings (sliding parts made of iglidur A180) and slewing rings that are extremely chemical-resistant and can be used at up to 180°C (using the iglidur H1 bearing material).

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Touch Bionics has employed world beating innovation to offer hope to those who have lost hands, arms or fingers. Paul Fanning reports.

British bionics

A Scottish company is leading the world in the field of bionic prosthetic technology with an award-winning combination of advanced mechatronic design and leading edge control software.

Based in Livingston, Touch Bionics is a leading developer of advanced upper-limb prosthetics (ULP). Its history goes back to a programme of work conducted at the Princess Margaret Rose Hospital in Edinburgh from 1963, starting with comprehensive research into developing prosthetic solutions for children affected by Thalidomide.

The myoelectric principles on which electrical prosthetics are based have been well understood in the prosthetics industry for many years and, put simply, depend on the sensation described by many amputees that their hand still exists – referred to as ‘phantom’ feelings. When encouraged to generate a strong signal, the patient is often asked to move and flex the missing hand to generate a strong control signal to a prosthetic.

Such devices have, until recently, been fairly limited in terms of function. This changed following the 2007 launch of the i-LIMB Hand, the world’s first microprocessor-controlled, myoelectric hand with five articulating digits (including a rotatable thumb) to offer users

a range of grip patterns previously unavailable to them.

At the heart of this, according to Touch Bionics’ Danny Sullivan, was the company’s development of the articulating finger. “That was the true revolution,” he says. “Prior to 2007, the industry standard for an electronic hand was a claw-like, pincer device. The fingers were completely rigid and essentially just supplied a pinch-type grip. There are several limitations to such a design. It’s not a human-like grip and these devices also offered only one strength of grip and made it impossible to grip any delicate objects without smashing them.”

Touch Bionics’ development of the articulating finger allowed a range of grip and dexterity functions to be made available to patients. These grip options enhance dexterity and support almost all daily living activities. For example, patients are now able to point the index finger to operate a PC keyboard, or to rotate the thumb to meet the side of the index finger to hold a plate or turn a key in a lock.

None of these functions had been possible before.

The inclusion of a thumb that can be rotated into different positions means the grasp of the hand is much more like that of a human hand with the articulating fingers able to close tightly around objects. Built-in detection tells each individual finger when it has sufficient grip on an object and, therefore, when to stop powering. Individual fingers lock into position until the patient triggers an open signal via a simple muscle flex.

The key design challenge to the development of the articulating finger lay in making motors and gearboxes small enough to fit within the constraints of the human hand. Because each finger has its own motor and gearbox driving it, the technology had to evolve.

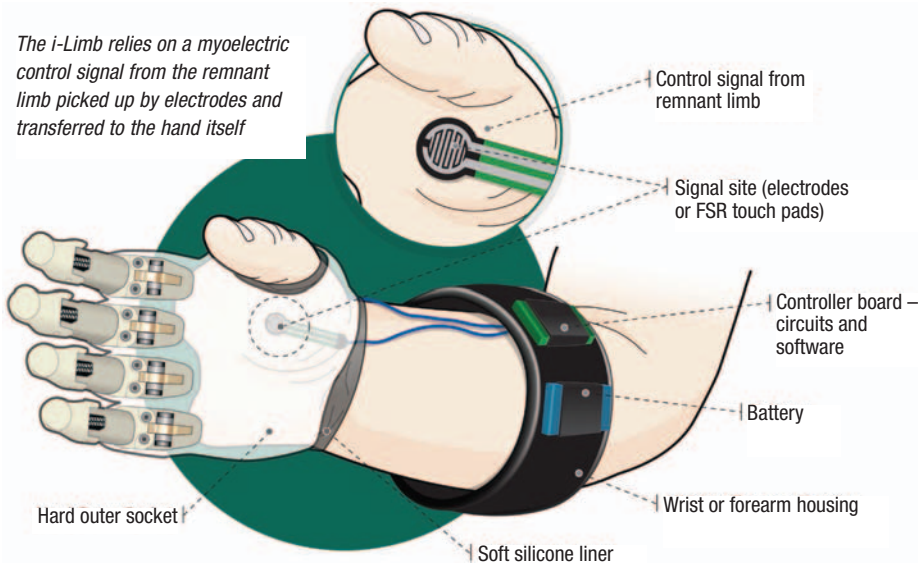
Developing systems for gearing the digits proved difficult as with most types of gearing, when the drive force is removed, the gears become free to move in the reverse direction unless a ratchet or braking system is introduced. The company therefore configured a worm and wheel gearing system in such a way that ‘backdrive’ problem would not arise. By avoiding backdrive, if the user closes the hand around an object and switches off the hand, ideal grip will be maintained.

A small-barrelled DC motor contained in



play a winning hand

The i-Limb relies on a myoelectric control signal from the remnant limb picked up by electrodes and transferred to the hand itself



each finger drives the digits. At first, the motor proved to have too much speed and not enough torque, but by experimenting with the ratios of the worm to wormwheel, a suitable compromise was found that allowed the fingers to move both quickly and powerfully.

In designing the body of the gearbox, it was necessary to minimise the size of its housing as thoroughly as possible. In practice, the plastic fingers fit onto or around the gearbox, which does all the hard work and forms the hub of each completed digit.

Touch Bionics also overcame the problem of holding delicate objects by devising a 'stall' function. Signals from the patient's muscles are processed by software and released to each motor in the hand, controlling their movement. As the motor moves, it draws current from a printed circuit board and a detection system causes the motor to stall when, during the cycle of its motion, it comes across an obstruction. Normally, motors that require such high-precision handling are fitted with a servo or encoder, but the hand is too small to contain such things. Instead, the processor monitors the current drawn by each motor and if one or more motors hits the stall current value, the processor allows the motor to continue to stall and then cuts its power,

maintaining the grip.

The launch of the i-Limb changed everything for the company. Since the launch of the i-LIMB Hand, more than 1,400 patients worldwide have benefitted from the technology. Quite how groundbreaking it is can be inferred from the fact that, since its launch three years ago, no competitive technology has emerged. A host of awards has also come the company's way, including Most Innovative Company of the Year in Europe in the 2010 International Business Awards, an IET Innovation Award in 2009 and Time Magazine naming the hand as one of the top inventions of 2008.

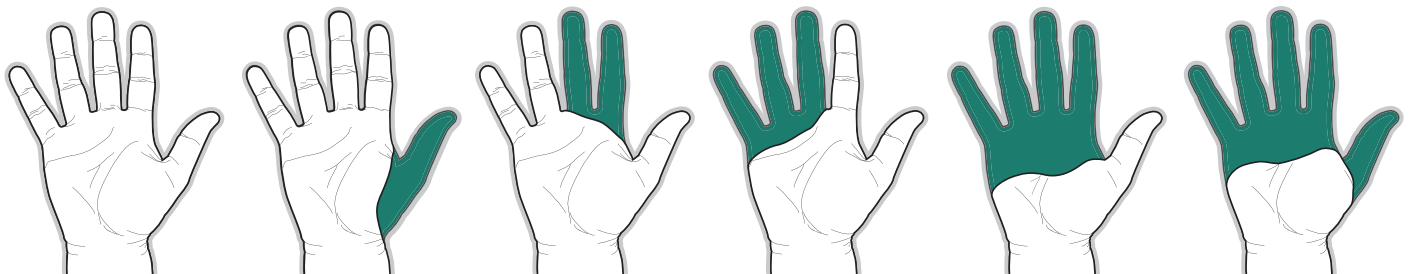
More importantly, perhaps, this success has allowed the company to develop other solutions. One of these has been ProDigits, which are designed specifically for users with partial hand

loss, an affliction for which there was previously had no powered options available to patients. Touch Bionics has also acquired a US company Living Skin, which specialises in the development of high-definition silicone passive hand coverings.

The company's latest release is the i-LIMB Pulse, which has taken the technology several steps further. Constructed on a chassis of aluminium, rather than high-density plastic, the Pulse is stronger than its predecessor, whilst remaining as light. The new device also responds 14% more quickly than its predecessor, thanks to a new battery assembly that allows it to draw more power to the motors.

The improvement that gives the Pulse its name, however, is its improved grip strength. Says Sullivan: "If users have the pulsing technology activated, it will force the motors in the finger to drive forward and provide additional strength and grip." This was not possible with the previous design.

Perhaps the most significant advance for the Pulse, however, is its use of software to refine and improve the use of different finger positions on the hand. Prior to the Pulse, if a different grip pattern such as an index point for using a keyboard was required, users would



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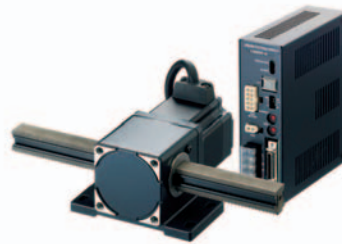
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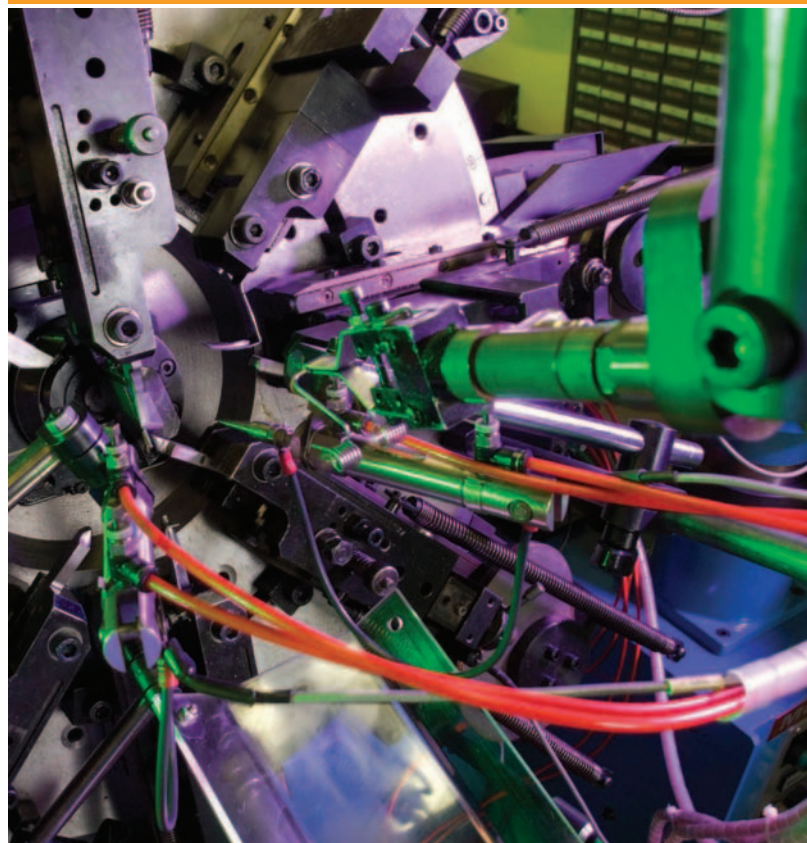
hold the finger while it was open and send a close signal to the hand and – because of the stall function – that finger would remain extended.

For the iLimb Pulse, however, the key innovation has been the invention of BioSim, a Bluetooth-enabled piece of software that allows both users and clinicians to connect to the Pulse and effect changes. This gives users the ability to automate many of the grip patterns used in day-to-day life. Says Sullivan: "These can now be activated in the software so that you could connect to the hand when you visit your prosthetist and from that you may determine that a pinch action would be useful to activate through the day. These features are activated by a series of triggers based on open/close signals. You would then need to send a range of signals that would be recognised by the software."

These signals come in several recognised forms; a common one being the 'hold open' signal that, after a set length of time, will automatically trigger the hand to go into a particular grip pattern. There is also a 'double impulse' or 'triple impulse' to quickly open one's hand two or three times to perform another action. Another is the 'Co-contract' signal to open or close at the same time. These four different triggers mean that users can have up to four different grip patterns available at any one time from a selection of eight.

Naturally, the software opens up a range of possibilities for the future, says Sullivan: "Rather than having to invent a whole new version of the hand, it could be possible to simply send out a software update to users to allow them to access different grip patterns. At the moment, the ability to effect different changes to the hand is limited by the number of inputs, so there is work going into looking at increasing the number of ways in which you can activate the different features."

www.touch-bionics.com



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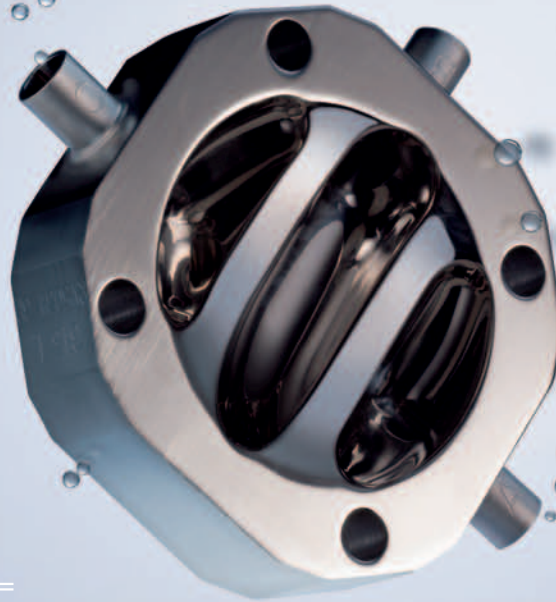
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FLUID CONTROL SYSTEMS

Anti-terror system finds cancers

Tom Shelley reports on the adaptation of a technology used to find weapons to identifying breast cancer.



Terahertz imaging, much publicised because it can identify non-metallic threats under the clothes of possible terrorists, can also be used to correctly identify cancerous tissue in the human breast during the course of an operation.

Working in the 1,000 GHz, 0.3mm wavelength band, the technology also has many potential applications in non-destructive examination of composites and integrated circuits.

TeraView chief operating officer Padraig O'Kelly explained that women in the west have a one in eight lifetime risk of contracting breast cancer. In 60% to 70% of cases, it is common practice to remove only cancerous parts of a breast, rather than the whole organ. However, without a quantitative, real-time method of identifying whether all diseased material has been removed during an operation, 20 to 25% of patients – more than 4,000 in the UK in any one year – are called back for an additional operation to remove further material. This is expensive, traumatic for the patient, and may delay patient adjuvant therapy.

The TeraView probe can solve this problem. It uses the same technology as the weapon-

DESIGN POINTERS

- TeraHertz radiation can distinguish between healthy and cancerous breast cancer tissue in real time, ensuring proper removal of all cancerous tissue
- It also has multiple potential medical, industrial and military uses in the non-destructive imaging of objects

detecting system that is in service at US Defence establishments and which is being considered for deployments at UK airports. In the approach, based on work by Professor Michael Pepper and colleagues at Toshiba Labs, a gallium arsenide substrate is struck with a 90fs pulse of near infra red light, resulting in a 500fs pulse of TeraHertz radiation. Power levels are extremely low and there is absolutely no risk to the patient.

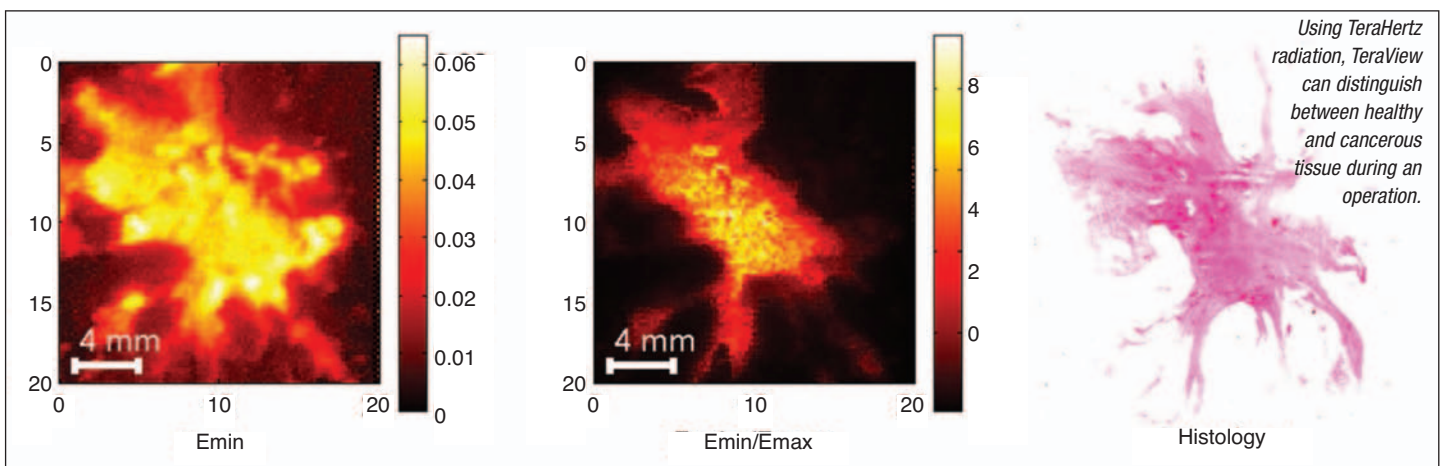
In a two-year development and ex vivo test programme part funded by the Technology Strategy Board, it was found that 90% of cancers and 81% of normal tissue, adipose and fibrous, were distinguished correctly. The overall proportion correctly identified was 82%.

A prototype machine is currently undergoing trials at Guy's Hospital in London. This is a system mounted on a trolley, with a probe on an umbilical and a window on the end of the probe. Terahertz radiation is sensitive to water but, while this causes some problems, O'Kelly points out: "It's the water-sensitivity that helps show up the cancer."

The system is not intended to replace biopsies, but to be able to assist the surgeon during the course of an operation – DCIS – Ductal Carcinoma In Situ. The next stage in development is to be multi-centre trials, and then commercialisation. O'Kelly said: "We are now seeking partners with a track record in delivery of scientific instrumentation to help fund the planned multi-centre trials in 2011 and to commercialise the resulting medical device."

Other potential medical applications include the detection of cancerous sentinel lymph nodes, but the technology is additionally suited to identifying impact damage in composites and faults in multi layer integrated circuits. It has also been mooted as a way of detecting low or no metal containing improvised explosive devices.

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Systems care, entertain and protect

Tom Shelley reports on what can now be done with bedside electronics without risking infection.

Embedded electronic technology within patient bedside terminals can provide medical information and entertainment while resisting the spread of possible infection.

Other products have been developed that enable the safer and more convenient handling of computers, allowing them to be safely moved around and used in the most ergonomic manners, while again resisting infection.

The developments come from two small companies in Surrey, Bytec and JAOtech, whose principals used to work for companies that supplied the military, but which now work closely together in the UK health market with separate facilities they both own in Taiwan.

One of the most important features of the bedside terminals is the keyboards, developed by Bytec but available exclusively for terminals supplied by JAOtech. Bytec CEO Bernard Mifsud explained that the crucial difference between it and other membrane keyboards is that no creases form when keys are depressed. This can be verified by dusting with talcum powder, cleaning it with alcohol wipes and seeing whether any powder remains. In addition, the keyboard monitors its own use and will, from time to time, illuminate a light that asks that the keyboard be disinfected. It then monitors which keys have been pressed. If all the keys have

been pressed, which is presumed to indicate that the whole keyboard has been disinfected, the light goes out.

In addition, the plastic incorporates a silver ion based anti-microbial called 'Biomaster', and Bytec supplies a special laser pen that produces a green spot on a substrate only if a security additive which is added to the anti-microbial is present. The device forms part of Bytec's quality

"Every hospital wants something different"

control and is also available to end customers who wish to make their own checks. The keyboard uses a wireless USB 2.4GHz connection to the computer terminal and recharges from a docking station that slots in firmly without leaving gaps.



The flat screen that contains the terminal electronics has been developed by JAOtech. As well incorporating the anti-microbial 'Novaron', made by Toagosei, the device is fanless, with speakers in its rear, all electrical connections underneath, and every effort made to round off corners to avoid dirt traps. The cast aluminium support arm acts as a thermal bridge to assist heat removal. Microphones built into the screen can identify ultrasonic tags and a new range, being launched in November 2010, will use capacitive sensing keys instead of membrane



buttons. CEO Warren Kressinger-Dunn explained that JAOtech works with system integrators, adding that: "Every hospital wants something different." The general idea is to make the terminals multi-purpose, so they allow access to patient medical records for the benefit of doctors and patients, equipped in at least some cases with bar code scanners to ensure the information is associated with the right patient. At the same time, entertainment services that may be free or charged for can be offered.

Bytec, as well as producing the Medi-Key keyboards for the patient terminals, makes a device called a 'Smart-Cart', to support, transport and protect computers and other high tech items.

This has lead acid batteries in its base which aid stability and power a motor driven lifting mechanism. This allows the user to have the equipment with which they are working at optimum height. Mifsud says it could have used gas struts, but these would have had to be tailored to what was on it. Two-hand operation with a button on each side prevents inadvertent operation or operation by children. The same company has also developed a non-motorised stand on wheels, called 'Medi-Stand', which incorporates an extruded aluminium pillar so that cables can be run inside it under a cover, instead of acting as dirt traps by being tied onto the outside of legs. It has a concave base so that blood or other fluids resulting from use of what the stand may be carrying, cannot run down the base onto the floor and get onto the wheels.

www.bytec.co.uk
www.jaotech.com
www.biomasteradditives.co.uk
www.toagosei.co.jp

DESIGN POINTERS

- Anti microbial keyboards have no bacteria-retaining creases when keys are depressed
- Anti-microbials incorporated in bedside terminals have uses in a range of sterile environment applications
- Medically compatible trolleys ensure the safe carriage and use of expensive equipment and reduce opportunities for infection

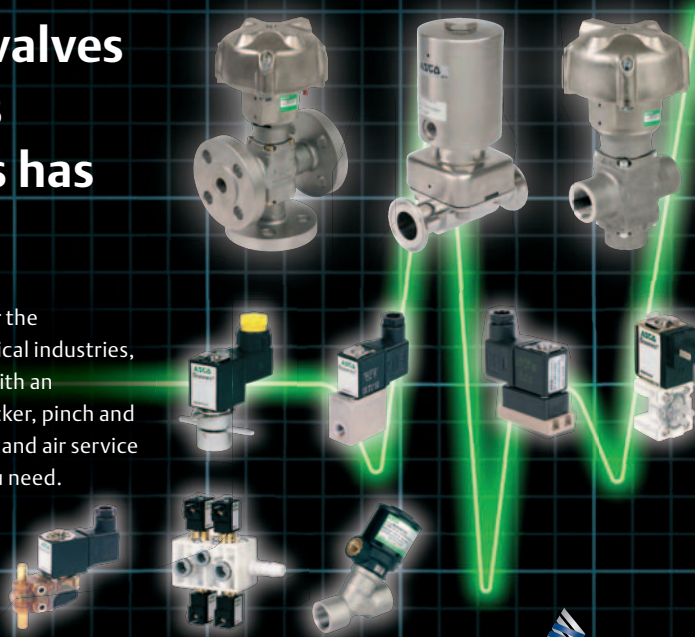
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A close-up, three-quarter view portrait of a middle-aged man with dark, wavy hair and a slight smile. He is wearing a light pink and white vertically striped shirt and a dark blue tie with a small, repeating geometric pattern. The background is a plain, light grey.

Andrew Reynolds-Smith

Andy Reynolds-Smith joined GKN in 2002 as Managing Director Operations – Europe for the Group's Driveline division. In 2004, he became Chief Executive of GKN Sinter Metals, joined the Executive Committee in January 2006 and became Chief Executive Powder Metallurgy, OffHighway and Industrial Services in June 2007. Prior to GKN, he held various general management and functional positions at Ingersoll Rand, Siebe plc (now Invensys plc) and Delphi Automotive Systems. He is chairman of the CBI Manufacturing Council and a member of the Ministerial Advisory Group for Manufacturing.

View from the top

Can UK manufacturing rebalance the economy? Can the skills gap be closed? And, more importantly, how? Paul Fanning asks Andrew Reynolds-Smith of GKN.

Few could claim to be better placed to assess the state of UK manufacturing than Andrew Reynolds-Smith. From his position as Divisional Chief Executive of one of the UK's most successful manufacturers to his roles as chairman of the CBI Manufacturing Council and member of the Ministerial Advisory Group for Manufacturing, his experience gives him an enviable perspective from which to judge the threats and opportunities that face the sector.

Reynolds-Smith's position was not always so exalted, however. He came into engineering via what he calls a 'classic apprenticeship route' with Texas Instruments, something he believes gave him an ideal grounding in both the technical and economic challenges posed by a career as an engineer. "I think it was an outstanding foundation for the way I've developed," he says, "and my career has gone forward because it gave me a real appreciation for the grassroots of manufacturing and technology – the real basics of it."

Given this, Reynolds-Smith is naturally keen to encourage young people into manufacturing. "If you look at how you can contribute to the developing needs of the world around you," he says, "then it's clear how much of it is based on manufactured products – engineering and technology making things possible. If you look at things as wide-ranging as the challenges we have in reducing CO₂ emissions or in terms of feeding an ever-increasing population, then it's clear that the solutions are going to lie in engineering and manufactured products."

Despite this, there is still a severe skills shortage, something Reynolds-Smith ascribes in large part to outmoded perceptions of the industry and a failure to create a coherent message about the sector. "There's a role to be played here by manufacturers and engineers themselves in terms of the way they present manufacturing," he says. "But I also think there's a need for there to be a clear vision on a national level that says engineering and manufacturing lie at the heart of a balanced economy."

The desire for a balanced economy has been expressed by all shades of Government for some time, but asked to define what he understands it to mean in terms of percentages, Reynolds-Smith prefers to look at the bigger picture. "There are endless arguments around how large a percentage of GDP manufacturing should represent," he says, "but what is absolutely crystal clear to me is that today it is simply too small."

His roles with the CBI and the Ministerial Advisory Group give Reynolds-Smith access to the higher echelons of power, but he is keen to state that he does not believe that this is solely a problem for Government. "I think it's very easy to say 'the Government needs to solve this problem'," he says, "but manufacturers are smart. If you look at the level of resilience during difficult times – particularly over the last couple of years – it's clear

that our manufacturing sector has remained strong ... so manufacturers aren't sitting there asking for someone else to solve their problems."

Where he believes Government does have a vital part to play is in creating an environment conducive to long-term manufacturing success. "The role that Government needs to play is in setting the vision and ambition for the shape of engineering and manufacturing as part of the economy." To achieve this, he advocates an approach based on more centralised support for manufacturing, rather than the localised approach previously represented by Regional Development Agencies. "I think it's less about central command and control and more about a centralised approach that brings to bear a greater level of national resources than a more localised approach. I think a good example is the composites strategy, where it was clearly established that we want the UK to be a world leader initially in aerospace composites ... Creating that vision has allowed a number of good decisions to flow."

The recession, of course, had a massive impact on all levels of industry, with GKN being no exception. However, the company has posted a pre-tax profit of £175million for the six months to June this year, a success Reynolds-Smith claims has been based on a clear strategy. He says: "We had a very clear focus for the year to ensure that we would work on the basics of the business. We would improve them to ensure that, as we came through the difficult recessionary period and the markets recovered, the underlying quality of the business was better. So a lot of work went into the operational structure and into the way that we develop our technical capabilities and particularly not taking our eye off the need to continually increase business wins."

"Our aim as a business is to ensure that we're ahead of the markets we serve. One way to do that is to be the best operationally, but companies also have to be differentiated technically by having the best products and processes. I think that understanding of technical differentiation and the value that it brings insulates you to some extent from the market and the competitive environment."

This emphasis on the importance of technical differentiation by the processes employed is exemplified, Reynolds-Smith believes, by the composite wing spar that GKN is currently developing for the Airbus A350 programme. He says: "There's a great example of a product that is lightweight and very high-performance and which meets the developing needs of fuel efficient aircraft of the future. But the key to it is how you make it: the automatic tape-laying that ensures absolute repeatability and quality in the volumes that are needed, for instance. I think that's a very good example of the capability that's now being developed in the UK that can make a difference."

Taking the fear out of PLM

Negative perceptions of Product Lifecycle Management and how to change them was the major theme to emerge from the recent Eureka PLM Round Table. Paul Fanning reports.

Discussion began with the presentation of the results of Eureka's PLM survey, which revealed a lack of widespread knowledge of the technology. Indeed, 71% of respondents did not use PLM software, while 86% of those described their knowledge of it as 'needing improvement'. The most significant barriers to adoption were its cost, difficulty in learning a new package and not seeing the benefit.

On a more positive note, 44% of those surveyed expressed an interest in learning more about PLM, while 16% of those surveyed anticipated adopting the technology at some point.

The low level of understanding did not come as a surprise to delegates, who confront these obstacles as a regular part of their daily work. Richard Allan gave his assessment of the situation as: "The biggest challenge is education through our engagement with customers ... It's often not really a question of objections so much as a lack of understanding. Because, when people have a lack of understanding, they don't really know what to object about. So they will tend to object first on the grounds of cost."

According to Gavin Quinlan of Concurrent Engineering, there is also a difficulty in perception relating to PLM at the moment. "The perception is that PLM is a big company thing," he said, "so immediately cost comes to the fore in people's minds because they think 'well that's only for the big boys and not for me'."

Graham Foster felt that one of the difficulties was that many of those on the design side saw PLM as a threat rather than an opportunity. He said: "If the route through which we're talking to people is coming from our background in CAD systems, through CAD data management through to PLM, then the type of people we talk to are the sort of people who tend to think of PLM as something that is there to intrude in

their lives and take control. They've got some CAD package that does everything that they want and they've got complete control of their lives and they've got lots of added functions that we keep piling in, so they see anything that's going to come in over the top of it almost as a threat to that. To the people who do the design work and interact with the CAD tools, they think it's going to ruin their lives ... If you think of it as an enterprise system that ties all the processes together, it becomes a lot easier to sell the benefits."

Allan concurred, saying: "It's a question of perception. When you talk to a designer and find out that they actually spend 25% of their time entering data into an ERP system and tell them that PLM's actually going to give them that time back and they can now be an engineer 90% of the time, rather than an administrator 35% of the time, their perception changes."

Backing this up, Quinlan said: "If people can be convinced that PLM is a tool that will

actually free them up, rather than act as a limiter, then suddenly they're interested." On the other hand, Foster pointed to rather more base motives helping to convince people, saying: "The point is [PLM] can ensure that every time you get a new design standard or a new spec from the customer that you track these things. Otherwise you might lose the fact that you could charge extra for a change! Mention that and then suddenly people get a lot more interested."

However, delegates did agree that they were beginning to see a shift in perceptions amongst SMEs in particular. Neil Templeton believed that much of this was due to pressure from higher





PARTICIPANTS (L TO R)

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Managing Director
Concurrent Engineering

Roger French

Managing Director
Root Solutions

Paul Fanning

Editor – Eureka Magazine

Neil Templeton

UK Country Manager - PLM Sales
INNEO Solutions

Richard Allan

Channel Business Development Director
PTC

Graham Foster

Global Services VP
PTC

up the supply chain. "In the last 6 to 12 months, there's been a definite mindset change about PLM within SMEs in the sense that there is an increasing understanding that they need to engage with PLM from the point of view of making their business attractive to some of the bigger companies they want to supply."

In relation to the objection that PLM is solely for the larger company, Foster said: "If it's a very small company with two or three people, then maybe the benefits are questionable, unless that company is part of a supply chain that needs to interact with a number of other, larger companies."

Quinlan raised the example of Irish company

Multihog, where PLM is being used by just two design engineers from a total team of 18. This has allowed it to develop an entirely new vehicle platform, through their design engineers, in less than six months using a PLM approach. Here, he says, PLM allows the company to work concurrently and collaboratively. He said:

"Multihog just does the design part, but it has to plug into four or five other companies. Using PLM makes that possible."

Roger French felt that a change in perceptions was an inevitability, saying: "There will come a tipping point. Look at ERP: if you're talking about a serious manufacturer, you simply couldn't imagine them not having an

ERP system, it's just a question of which one they choose. I suspect it's going to get that way with PLM."

Foster pointed to examples where this was already happening. "In the aerospace and defence industries, it's already being forced on them by the supply chain; mainly for the collaboration side of things, but also for the element of control you need to have over your suppliers in those industries. If the supplier doesn't have the proper tools and processes, then they won't get the contract."

Another major factor in influencing people to engage with PLM, according to Allan, is the gradual shift in generations. "You're seeing a change of generation. Our first generation of 3D CAD users is starting to retire, but our first generation of Web 2.0-type engineers, who are used to living in an electronic world, are becoming lead engineers. So the question is starting to arise of how you capture the knowledge from the heads of those older staff and make it available to the younger staff? PLM is the answer."

As far as problems with acceptance are concerned, Quinlan believes that much of the problem lies in the perception of PLM as a monolithic, all-encompassing entity. "There's a bite-sized way of introducing PLM to customers," he concluded. "You don't have to go straight in with a full enterprise PLM system; you eat the elephant in little pieces. It's not necessarily this huge idea that people have to absorb as one big project."



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Computing aids advance rapid development

Tom Shelley reports on technologies to aid brainstorming and getting products to market faster, especially in the challenging field of alternative energy.

A new concept harnesses off-the-shelf the computer hardware and software to greatly assist brainstorming, while advances in the automated generation of control code accelerates the transfer of ideas into real products, especially important in the development of green and clean technologies which pose new and often very difficult engineering design challenges.

Dr Andy Bardill, programme director in the Product Design and Engineering department at Middlesex University, has devised a brainstorming studio that combines projectors and webcams with a system for recording the resulting ideas and discussions.



One of projectors is aimed downwards onto a horizontal table, while others project onto vertical screens around the room. The system calls up different designs when the webcam above the table detects 'fiducials' – symbol shapes placed on an appropriate part of the image. Designs can be marked up on the table and this information is then captured by the webcam. Video and audio recordings are made of discussions, which are stored in blogs. Prince said the system 'allows us to get direct feedback on our blogs'.

Having come up with an idea and baked the design, the challenge then comes to implement it as quickly as possible. One of the most challenging design areas is in harnessing

alternative sources of energy. While the base ideas may often be simple, implementing them usually means venturing into new areas of technology.

Efficient operation almost inevitably involves sophisticated control and monitoring and, since one of the quickest ways of implementing such systems is to use National Instruments LabView and related products, users will be pleased to hear that these have just been through a major revamp of their compiler technologies.

Among British and Irish recipients of the scheme so far, Romax Technology in Nottingham is using LabView and CompactRIO in software developed to improve monitoring and predictive maintenance in wind turbines. This, according to Ian Bell, market development manager at NI, has now gone into 'one or two turbines'. Failures of bearings and gearboxes in wind turbines have proved to be a major problem and repair and replacement costs tend to be high, especially if the turbines are situated offshore.

Magnomatics, a spinout from the University of Sheffield is using LabView for the control and data acquisition system for testing and



DESIGN POINTERS

- Combining projectors with webcams recording equipment to capture markups and discussions has been found to be a useful tool to assist and record design brainstorming sessions
- Automated generation of code to control and log data in alternative energy systems greatly accelerates implementation and reliability

CompactRIO to rapidly prototype and deploy controllers for its non contact gearboxes. These use only magnetic forces to transmit torque between elements, and this requires no gear lubricants and avoids friction losses and the possibility of failures arising from chipped and broken teeth.

Wavebob, invented by Irish physicist William Dick, uses two bodies above each other, which move up and down relative to ocean waves and to each other. The bodies are coupled by hydraulic cylinder pumps which extract the power from the relative motions. In order to optimise performance and protect itself against damage, it, Bell said: "Wavebob tunes itself to adapt to changing wave conditions." A half size unit has been on trial in Galway Bay for more than a year, and the next stage is to build and deploy full sized units in a farm, starting in 2013. Sorting out potential problems at an early stage is crucial, since the idea has a number of increasingly established competitors.

Last but not least, with few details yet revealed, Sunamp in Scotland, is using LabView in a new phase change heat storage system which also has competitors using similarly-based technology.

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Rapid prototyping 'shows its metal'

Tom Shelley reports on advances in rapid prototyping, such as the manufacture of more efficient heat exchangers and hydraulic manifolds.

Additive methods are allowing the manufacture of heat exchangers that are more efficient than conventional devices and can handle multiple fluids, while it also possible to make hydraulic manifolds which more than halve fluid flow losses.

Initial applications are seen in aerospace and motorsport but, as costs of machines reduce and technology continues to improve, such techniques are likely to expand into a wider range of industries.

As an example of what can be done, 3T RPD in Newbury has made a novel heat exchanger out of 316L stainless steel using DMLS – Direct Metal Laser Sintering. CEO Ian Halliday explains that, as well as being of a very unusual geometry, which could not be made any other way, it possesses struts or 'Turbulators' inside the tubes to prevent laminar flow and encourage turbulence and so improve heat transfer.

DMLS using metal is not quite as straightforward as SLS (selective laser sintering) using plastic, because metal, particularly stainless steel, has a melting point well over 1000°C and conducts heat. This means, according to Halliday, that normally "you have to support it or it sags". However, the demo heat

exchanger was self-supporting, without any pillars or supports that would need to be cut off afterwards. "The trick is", Halliday explains, "to make all surface parts so that they are more than 35° to the horizontal." This was achieved in the design by making use of Within Enhance software and working in partnership with Dr Siavash Mahdavi, managing director of Within Technologies, to generate the structure. The tubes are tear drop shaped and the outside has

Z Corp has introduced two new 3D printers, including the monochrome ZPrinter 150



also been designed to increase the cooling surface area.

The construction has additionally been designed to impart structural strength into whatever product it is intended to form part of and can be made in any shape.

As well as generating the shape and ensuring a minimal angle to the horizontal, the software allows the design to be optimised for structural strength and/or minimal mass. Initial potential applications are in motorsport, particularly F1 and aerospace. Saving 100kg is said to save 4 million tonnes of CO₂ emissions, as well as a substantial cost saving over the



Additive manufacturing can be used to make heat exchangers more efficiently

working life of an aeroplane.

The other project on which 3D RPT has been working is a hydraulic manifold. As Halliday explains, by using additive manufacturing "you can have curved tubes, inside instead of right angled bends, which reduces fluid pressure drop and improves flow by one and a half to two and a half times". He cites here studies undertaken by Red Bull Racing.

DMLS can be applied to titanium and Inconel alloys and aluminium is now also available.

In other RPD developments, Glidewell Laboratories, which provides dental laboratory services to North America has announced its latest collaboration with Objet Geometries using Objet's 'Eden' 3D printing systems. Z Corp, on the other hand, has introduced two new 3D printers, the monochrome ZPrinter 150, priced at £10,900 and the multicolour ZPrinter 250, priced at £17,900. Resolution is 300 x 450dpi, minimum feature size is 0.4mm, vertical build speed is 20mm/h and build size is 236 x 185 x 127mm.

Finally, the trophies presented at this year's Hungarian F1 grand prix were made by Materialise using SLS polyamide and subsequently lacquered in gold, silver and bronze. The Eni trophies are made as a series of linear elements that represent a fire-breathing, six-legged dog.

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DESIGN POINTERS

- It is possible to use additive manufacturing to make heat exchangers that are more efficient, structurally stronger and lighter than conventional products, and fit them into any shape
- Similarly, it is possible to make hydraulic manifolds that have curved internal tubes instead of right angled bends that reduce pressure drop and enhance flow by between 1.5 and 2.5 times relative to conventional products made by cross-drilling blocks.

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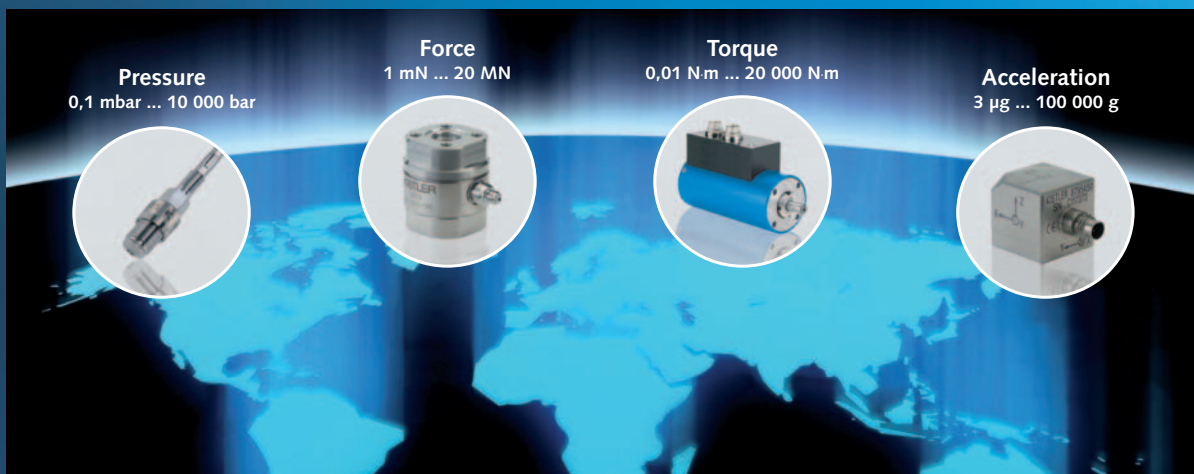
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White light leaps forward

A UK company has developed a technology that could revolutionise 3D scanning. Paul Fanning reports.

3D scanning is changing, and that will radically alter the way we use 3D data in product development.

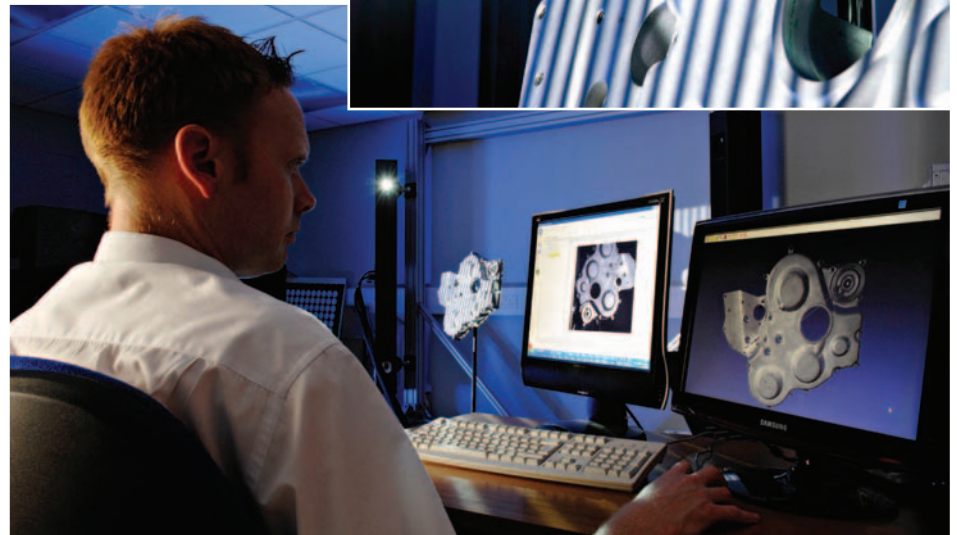
This, at least, is the message from Phase Vision, a UK company that has recently launched a highly innovative series of new generation, white light scanners that it believes could revolutionise the future of 3D measurement.

White light scanners are not new of course. However, like laser scanners, early white light scanners had a fixed 'stand-off distance'. That meant that, while the scanner had the potential to measure large objects, they had to be square on to the scanner and in just the right place or the lenses became defocused and distorted the images.

Another challenge facing all triangulation-based systems was the ability to see into holes. Triangulation works by sending a ray of light onto the object and measuring the reflection on the scanner's camera. There has to be an angle between the two beams – which limits the depth of holes which can be measured. The greater the angle, the more accurate the system – but the more difficult it becomes to see into holes.

Shiny surfaces are also a challenge for any optical scanner as reflections cause 'noise', which can confuse the scanner. Composite components are also challenging, with light-absorbing surfaces which make it hard to see the projected light. That lack of contrast introduces yet more noise into the system – but the alternative to optical measurement (using mechanical probes) is impractical.

Recognising that all these problems stemmed from the 'signal to noise ratio', Phase Vision decided to develop better software algorithms to separate the signal from the noise. While this greatly increased software complexity, it was also a lot cheaper than the alternative of using more and/or better expensive, high-end CCD cameras. Equally, sophisticated software



eliminated the need for a second camera and allowed the triangulation angle (between the camera and projector) to be reduced. It even allows the scanner to operate in brighter lighting and to cope with a range of standoff distances.

The angle between the optical devices defines how usable the system is. With a single camera, the required angle is reduced – giving a deeper usable volume in which components can be measured. It also gives a greater ability to see into holes and a greater ability to measure objects at oblique angles. By enabling use of a single camera and smaller angles, the Quartz system has reaped huge benefits in usability.

Central to the system is that, rather than using 'black and white stripes', the Quartz system uses sine waves – smooth sweeping transitions. These images do not have sharp edges, so are relatively unaffected by most of the sources of noise. This allows complex software to distinguish between the noise and the object, and provides a massive improvement in accuracy.

By using complex algorithmic software to eliminate noise, the Quartz designers also enabled the use of high-power digital projectors – traditional structured light systems have used old-fashioned 'slide' projectors for the highest possible quality images. By using the most powerful projector available in a 3D scanner, Quartz has the power to measure large objects in normal working environments; while digital image control allowed the use of an even more sophisticated projection technique, where the projected sequence is repeated twice – once for each polarisation. This allows two measurements to be made via independent optical paths – giving extensive cross-checking within the system and eliminating spurious data introduced by highly reflective surfaces.

Finally, the ability to work accurately with defocused optics enables the Adaptive Range Technology, which is integrated into Quartz scanners. This allows the scanner to take advantage of the very deep measurement volume the single-camera architecture enables.

www.phasevision.co.uk

Inclinometer cuts tipping risk

In an attempt to bring a new level of safety to operators of tipping vehicles, Edbro has launched an 'inclinometer' tipping monitor to help ensure that vehicles don't reach a dangerous angle during operation. The inclinometer has an

in-cab display which will accurately show the tipping angle to the nearest 0.1°, and automatically compensates for sloping ground. When a pre-set danger point is reached a warning alarm begins to sound both inside and outside the vehicle to warn of the

potential of the vehicle overturning. At this point a pneumatic valve is switched to prevent further tipping forcing the driver to lower the body and find safer ground conditions.

The Inclinometer has a weatherproof IP rating of IP68 and includes a pneumatic tipping cut off valve for safe tipping switch-off in the event of failure. The alarm is MIRA tested for use on and off-highway, sounding a spoken alarm that plays at 85db.

www.edbro.co.uk



Load sensors get smarter

A smart load sensor developed in the UK by Sensor Technology provides all the information needed to optimise efficiency and increase profitability of a wide range of industrial operations.

The development, called LoadSense, is an intelligent load sensor that can be integrated with a crane hook, forklift or other handling device. It has an on-board single-chip computer for recording, analysing and archiving readings, and wireless communications capability which can transfer data in real time to a host computer.

Internal batteries make LoadSense's operation completely autonomous. As such it can be deployed with minimal disruption to operations, and will automatically begin transmitting data. No special training is required to install or operate the unit.

www.sensors.co.uk



Rotamass evolves

The Rotamass Coriolis mass flowmeter now has a density accuracy of up to $\pm 0.0005 \text{ g/cm}^3$, which is achieved and substantiated by a density calibration with three different liquids and at different temperatures. This means that reliable and accurate density measurement can now be carried out over a wide operating temperature range.

One of the indirect benefits of accurate density measurement is more accurate concentration measurement of mixtures and solutions, such as oil and water mixes or sugar solutions. The corresponding concentration



values are displayed, as a percentage or in °API, °Brix or °Baume units, and can be integrated into the process control system via analogue or digital signals.

Traditionally the mass flow output from Coriolis meters responds in a highly sensitive manner to gas bubbles in liquids. The Rotamass, on the other hand, has a special sensor design which can tolerate a relatively high proportion of gas in the medium. Diagnostic functions also enable the detection of gas bubbles contained in the liquid, so that an appropriate response can be initiated, guaranteeing functionality even at high gas concentrations.

www.yokogawa.com/uk

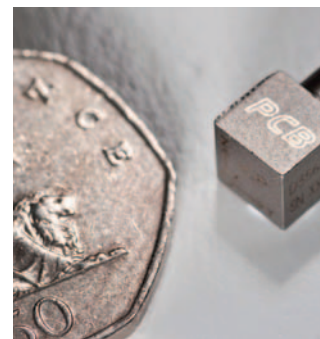
Mini accelerometer withstands high temperatures

PCB Piezotronics has launched an ultra-miniature triaxial accelerometer that is capable of measuring vibration on the smallest and lightest of structures and can operate in high temperature environments up to 163°C.

Weighing 1gram and housed in a 6.3mm cube, the HT356A01 is ideal for measuring shock and vibration on electrical components such as printed circuit boards and hard disk drives, lightweight automotive systems such as castings and pipes, wind tunnel testing of aerospace scale models and biomedical applications.

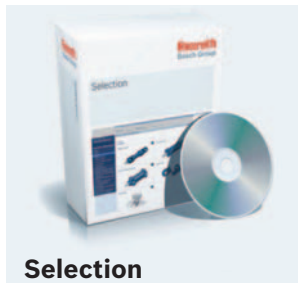
HALT, HASS and ESS testing can be run up to higher temperatures than a standard ICP or IEPE sensor. Cased in titanium and hermetically sealed, the HT356A01 offers excellent durability allowing it to be used in harsh environments. The sensor can be adhesively mounted in even the tightest of spaces while the industry leading resonant frequency of more than 50kHz means that engineers can test up to high frequencies with a high degree of confidence.

www.pcb-sensors.co.uk





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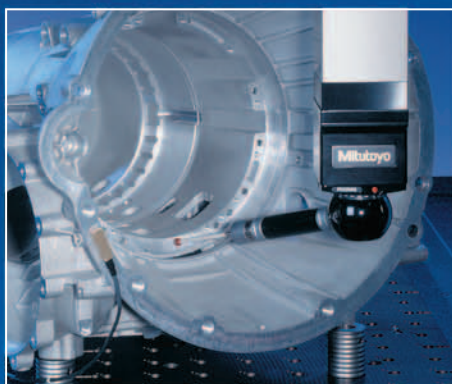
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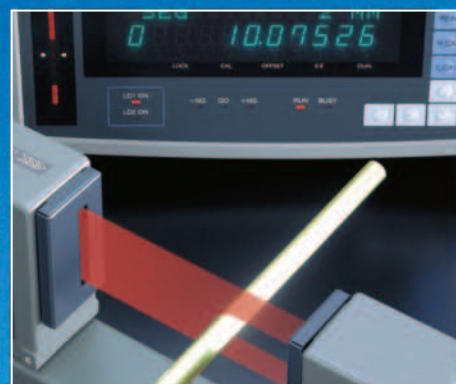
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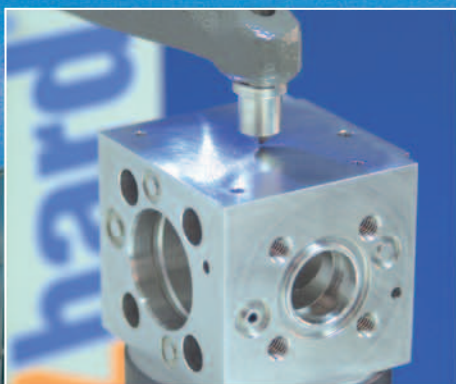
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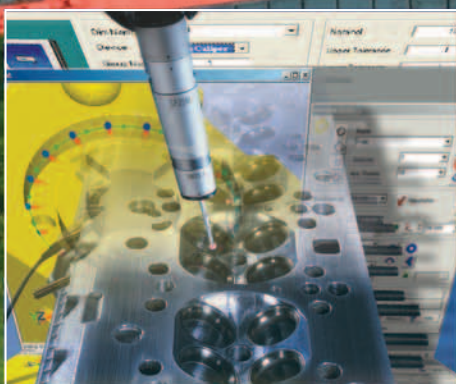
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Fast components take the heat

Tom Shelley reports on high efficiency automation actuators and motors for hot places.

Automated baggage sorters use actuators that consume only about a quarter of the energy required by alternative systems, while new motors have been developed for systems operating at up to 200°C and submerged in oil or vacuum.

The actuators are linear motors, but linear synchronous motors (LSMs) as opposed to linear induction motors (LIMs). LSMs are not in themselves new – Hugh-Peter Kelly pioneered such actuators back in the 1980s. But Danish company Crisplant is the first to employ them in baggage and parcel sorting systems.

The difference between LIMs and LSMs is that in an LIM, alternating current in an unrolled motor stator creates a moving

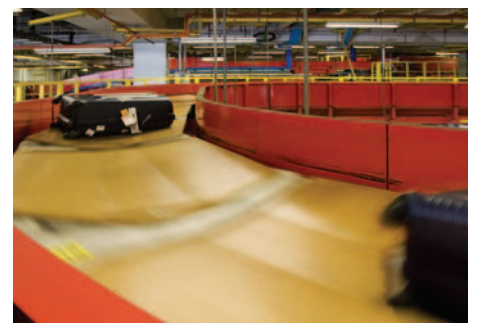
magnetic field that induces currents in a typically aluminium reaction plate – the rotor in an ordinary motor. These currents interact with the moving stator field to produce thrust. In an LSM, on the other hand, the magnetic field is produced by permanent magnets. In the case

of the Copley Motion Systems design, permanent magnets are placed in alternate orientations, end-to-end in a stainless steel tube. The tube with the magnets in it can be either the fixed or the moving part of the actuator.

Crisplant has been using LIMs for high capacity sortation since 1990, but the company's LS-4000 series are the first to use LSMs. Models in the series are the LS-4000E tilt tray sorter, which can handle single tray items up to 1 x 1m and weighing 50kg, and the LS-4000CB cross belt sorter, which provides precise positioning and more gentle handling, making it suitable for high-friction and fragile items, especially in overnight delivery applications.

According to Crisplant, the LS-4000E consumes an average of 2.4kW per hour while a comparable sorter using LIM technology consumes 10.3kW. The LS-4000CB similarly consumes 2.7kW, while a comparable LIM-powered machine requires 11kW.

Applications include an LS-4000CB as part of an automatic tray handling system for



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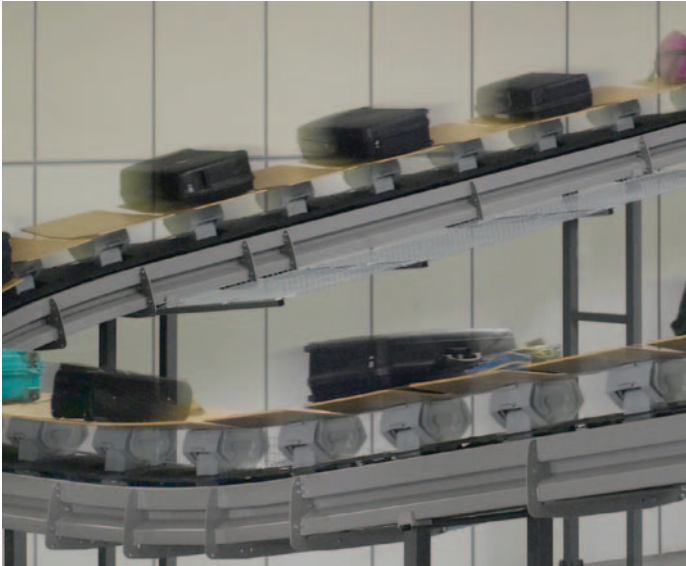


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Posten Norge's Østlandsterminalen mail centre near Oslo, and an LS-4000E sorter for TNT Pakketservice. Airport baggage handling applications include an LS-4000E tilt tray sorter and two LS-4000E sorters for Melbourne International Airport, scheduled to be operational in December 2010, and tilt tray sorters and a sort allocation computer for OR Tambo International Airport in Johannesburg, which was operational in time for the 2010 FIFA World Cup.

More efficient than conventional motors and of increasing application to automation systems are brushless motors. These too use permanent magnets. Maxon Motor has just brought out a 22mm diameter 80W three phase brushless motor that can run in ambient temperatures of from -55 to 200°C, with internal components designed to withstand temperatures of at least 240°C. It is to be followed by 32mm and 42mm versions, plus a range of compatible gearheads.

Applications include: gas turbine starter/generators for aircraft engines, regulation of combustion engines, oil and geothermal wells, robotic exploration vehicle systems, pumps and valves for liquid metal cooling systems and turbine fuel and steam and control, and valve adjustments for gas and steam power stations.

The motors can be used in high vacuum, shock loaded and vibration applications to MIL-STD810F/Jan2000 Fig.514.5C-10 and submerged in oil.

www.copleycontrols.com/motion

www.crisplant.com

www.maxonmotor.com

DESIGN POINTERS

- Linear synchronous motors use about one quarter of the power required by linear induction motors in sortation applications
- Brushless motors have been developed that can be operated in ambient temperatures ranging from -55 to 200°C

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Jan Ruiter, SKF

Hot coatings for composites

Tom Shelley reports on coatings that can protect composites against intense heat and provide other beneficial properties.

DESIGN POINTERS

- It is possible to lay down ceramic thermal and/or electrically insulating coatings on carbon fibre and other polymer based composites using a DC arc plasma torch.
- The usual purpose is to protect against degradation by hot exhaust gases in motorsport, but the process has also been applied to enhancing friction on a braking surface on a bicycle wheel and resisting wear

Carbon fibre composites are regularly being coated to protect them from the effects of hot vehicle exhaust gases, as well as to provide other beneficial properties, such as resistance to abrasion and other physical damage.

A recent example is providing high-friction, wear resistant brake surfaces for upmarket bicycle wheels and to resist wear. Coatings can be ceramic or metal, and come in a wide variety of colours, for those concerned with appearance as well as performance.

Zircotec in Oxfordshire specialises in coatings sprayed on using modified arc plasma torches. Technical director Dr Andy McCabe, said recently: "It has been a really good year for us in F1, but we want to take the technology into other industries."

When Eureka first came across Zircotec, the company had recently spun out of AEA at Harwell, and was focussed on spraying zirconium

oxide onto motorsport vehicle exhausts in order to reduce heat transfer to adjacent bodywork. It still does this, but also a lot of other things as well and has been actively filing patents to protect its IP, including its technology for coating carbon fibre composites.

The purpose can be to coat a part that is hot to reduce heat transfer to something else, to coat a part to prevent it being over heated by something else that is hot, to reduce wear or increase friction.

Possible coatings, as well as zirconia, include aluminium on top of zirconia, stainless steel, molybdenum, tungsten, 'Diamond black', and a 'Ceramic mix' to control both heat transfer and wear at the same time. Dr McCabe said that, before laying down the protective coat, 'there is a proprietary bond coat for all surfaces that is crucial'. Finishes are now available in 14 different colours.

One of the motorsport applications for F1 teams that we were shown was a zirconia coat on part of a carbon fibre suspension wishbone to protect it from exhaust gases. This is no mean challenge since the 50kW DC arc plasma torches used work at a temperature of around 20,000°C in order to heat and melt the feedstock material. Coatings go down as a series of fine, molten splats. Dr McCabe said: "We can also make this black, or overspray it

with a metal finish, so competing teams cannot see what has been done.

Another F1 composite coating application is to coat diffusers. Routing hot exhaust gas through a diffuser along with ambient air to increase combined gas speed is allowed in the rules and enhances down force, reducing lap times by just over 0.5s. Composite surfaces require chemical or physical preparation before application of the bond coat. The process can also be applied to the coating of sintered nylon or even fibreglass. Exact parameters to ensure successful coating are critical. Dr McCabe says that it is essential to control the whole range of spray parameters, the 'range of materials that you put down first', as well as ensuring sufficient cooling of the part during the coating process. He considered that, "Most people who tried to do this would damage the part during pre-preparation," he claimed.

It is also possible to lay down aluminium oxide coatings on carbon fibre that are highly electrically insulating as well as thermal insulating. Zircotec also has a ceramic coating which only requires a 100µm thick layer to insulate to 10kV.

www.zircotec.com



Ceramics in a bag give extra strength

Tom Shelley reports on a construction that allows ceramics to withstand massive impacts.

By putting a ceramic plate in a pre-tensioned composite containment, it is possible to make light weight human body armour that will withstand repeated impacts by quite large, armour piercing bullets.

It is much lighter and cheaper than conventional body armour and at the same time shows a new way of working with ceramics in engineering, opening up possible applications that could include higher temperature running engines and gas turbines and longer lasting linings for grinding and crushing equipment.

The development is the invention of Shaun Smithy-Ward, the proprietor of VestGuard, which has been developing ballistic products from more than ten years. Currently, more than 160,000 of his company's individual body armour systems are in service with customers who range from church leaders to national armies and police forces.

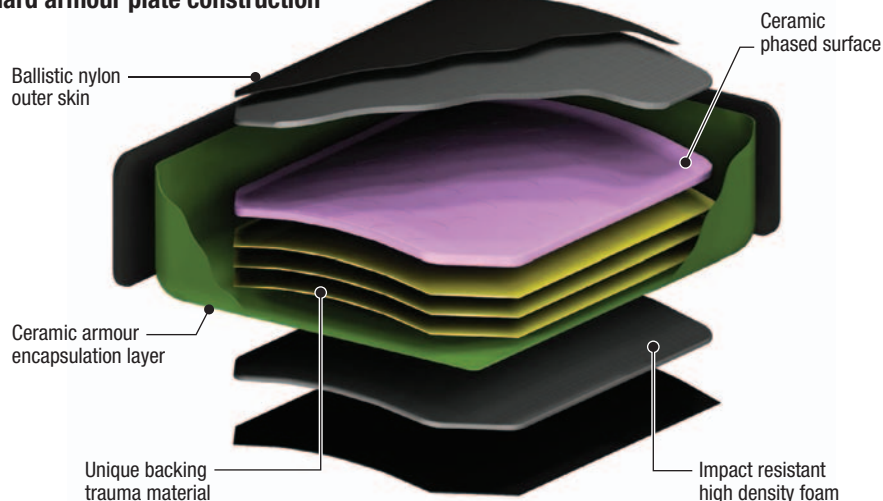
He says that researching papers published by universities was key to understanding the possibilities of new materials, but the breakthrough came when undertaking development tests on a range at Shrivenham. "The assisting technician on the range suggested we stop testing and pack up one evening, but I told him I wanted to carry on, so I tried some unusual combinations of materials that I had an interest in and found that they worked better than what we had been working with."

Traditionally, he explained, body armour plates

DESIGN POINTERS

- A ceramic plate can have its ability to withstand impact greatly enhanced by bonding it to composite in tension and encapsulating it
- An adhesive has been found which can give the required strength and which retains this property during autoclaving

Hard armour plate construction



were made from aluminium oxide, which is hard enough to shatter armour piercing projectiles, "And then many manufacturers moved to boron carbide or silicon carbide, but tiles of such materials typically cost some \$250 per tile for a small weight advantage. This didn't add up to me if you can achieve the same ballistic performance by using alternatives with a lighter weight for a third of the cost".

What he has developed is a phased ceramic plate, made of a "proprietary concoction" developed by VestGuard, which is then put into compression by being bonded to pre-tensioned glass-reinforced plastic, using a specially developed adhesive system and autoclaving, followed by encapsulation in another ceramic. This is then backed by impact resistant high density, low weight, unidirectional fibre. The effect of putting the ceramic strike plate into compression prevents crack growth outside the immediate impact area. The high density fibre then absorbs the impact energy of the pieces of shattered projectile.

The company makes both this material, which

is about the same weight as the standard armour supplied to our soldiers, but stops much heavier ammunition, and also its "Max-1 Nine shot hard armour plate", which weighs only 1.7kg.

Why these material combinations work as well as they do is not entirely clear. Smithy-Ward told us that even after using high speed video at 250,000 frames per second, the company was no wiser as to how the material resists impacts, and the development process had mostly been a matter of trial and error, although they were now doing computer modelling. However, it is well known that surface tension in ceramics enables them to defeat rifle ammunition, and if you can keep the plate within a tensioned containment and localise crack growth, you have a good prospect of a multi-hit plate, but this is normally a difficult thing to accomplish. Key to the current configuration is the adhesive, that has to be able to survive autoclaving, and we were told that VestGuard had investigated in depth before something special was developed for it by its supplier.

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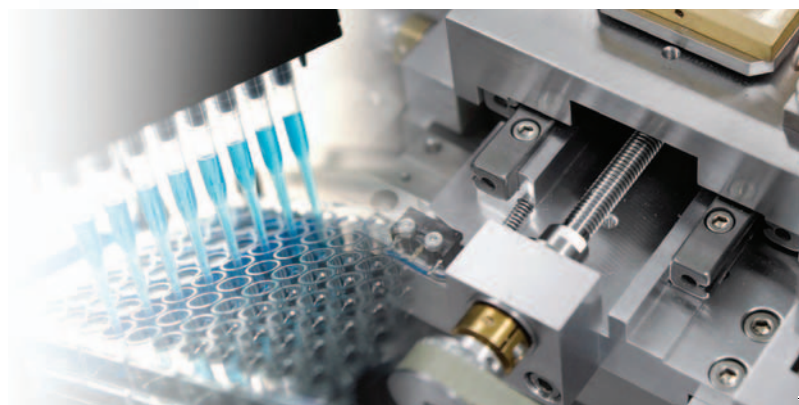


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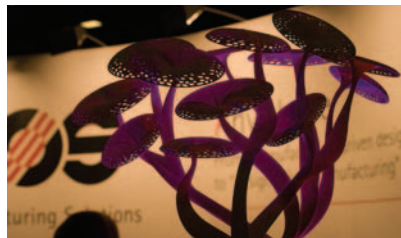
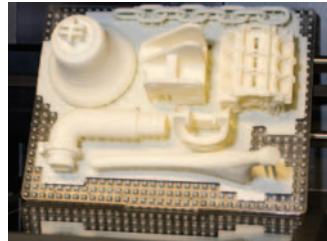
With the latest technologies in the area of additive and rapid manufacturing techniques, TCT Live 2010 will offer visitors a clear view of the future.

Taking place from 19 to 20 October at the IEC Ricoh Arena, Coventry, the TCT Live 2010 event will once again bring together the leading players in the product development and manufacturing sector, to showcase the latest technologies available to help product development professionals stay ahead of the competition, reduce product development times, control cost and improve efficiency.

TCT Live is the only UK event to focus on providing solutions for reducing time-to-market. Its focus on Rapid Product Development and Additive Manufacturing technologies stands TCT Live apart from other events, positioning it as the event to attend to learn about and source the most up to date information in the RPD and Advanced Manufacturing sector.

TCT Live draws together those involved in the concept, design, manufacturing and specification functions. Exhibits cover the range of Rapid Prototyping and Manufacturing machines and technologies, including major suppliers of Inspection, Scanning and Digitising, CAD/CAM/CAE software and materials. TCT Live 2010 will focus on machine demonstrations – allowing visitors to compare and contrast in a live environment.

Alongside the main exhibition is a



range of special visitor attractions. These include the Additive Manufacturing Conference, the return of the RP and M Technology Introduction Session, and the Inspection, Digitising and Metrology Session. New this year is a full day of technology briefings: bite-sized presentations from the industry's leading machine manufacturers.

Seminar sessions will focus on Inspection and Metrology and the latest developments and breakthroughs in rapid prototyping technologies. There will also be a return of the introduction to additive technologies sessions.

This year also sees a new track aimed at those looking to purchase 3D printing or additive manufacturing machines. In this track, all major

vendors will be invited to showcase their latest developments in short sharp presentations, which will give the buyer a snapshot of what is hot and imminent from each of the major players.

The Additive Manufacturing Conference will include two days of industry focused papers looking in-depth at the use of the Additive Layer Manufacturing. The conference will also present applications of the technology in the automotive, aerospace, medical/dental and Jewellery sectors.

The conference will also examine the business advantages of adopting additive manufacturing and consider sustainable manufacturing models. Day 1 will feature an overview of the ALM Landscape and New Breakthroughs in ALM

Exhibitors set to return to in 2010 include: Delcam, MTT Technologies, Envisiontec, 3DDC, Objet Geometries, Z-Corporation, DSM Somos, Materialise, Concurrent Design Group, Proto Labs, Wenzel, Laser Lines, GOM UK, Voxeljet, John Burn, Midas Pattern, Majenta Solutions, INNEO Solutions and Hexagon Metrology.

Nikon Metrology, the result of Metris and Nikon merging is planning to make a splash with one of the biggest booths in the show.

For more information on the exhibition and conference line up, go to www.tctshow.com.

Times may be challenging.

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EXHIBITING AT TCT LIVE 2010

• Measurement Solutions is a leading supplier of innovative, easy-to-use, portable 3D measurement and scanning systems. TCT2010 will see live demonstrations of the latest Handyscan3D and Kreon high accuracy laser scanning solutions. A particular focus of attention will be the ease of use and the ability to inspect and reverse engineer all types of components to a high resolution and accuracy, from small plastic mouldings to a complete car.

Stand M14

• From SLA and SLS to 3D Printers and a complete Rapid Prototyping and Manufacturing parts service with 3Dproparts™, 3D Systems' solutions have been leading the applications evolution. 3D Proparts claims to be the only company to offer five distinct technologies and the widest material selection available to support the most demanding product design, development and manufacturing requirements with the latest prototyping and manufacturing solutions. At TCT 2010, it will present its latest solutions.

Stand M8

• Accelerate your design iterations with the Studiomill fast prototyping machine. Just minutes from CAD design to physical prototype. It is the most affordable business prototyping solution and is sufficiently versatile to make outsourcing of many of your prototypes a thing of the past. Capable of producing complex five axis parts, Studiomill is at home in small and large businesses. Prototyping in non-ferrous metals, sheet materials, plastics and PU boards; Studiomill has the versatility to accurately reproduce your designs.

Stand N12

• 3T RPD Ltd is leading the way in the supply of metal parts using Direct Metal Laser Sintering (DMLS), and is bringing the reality of Rapid Manufacturing to many of its customers. Negating the need for expensive tooling, DMLS produces lighter weight components with higher performance in

shorter leadtimes, opening up new opportunities to many industry sectors. Priding itself on consistently supplying the highest quality parts, 3T continues to give the best customer service and the fastest possible delivery of not only metal parts but also plastic prototypes, as it has the UK's largest Selective Laser Sintering (SLS) capability.

Stand F10

• C-Tech Innovation Limited is a professional Engineering and Mechanical Design Consultancy. Its team of engineering and product design consultants is committed to delivering a first class service, combining its immense knowledge of materials and processes with the latest 3D CAD software and prototyping techniques. With extensive laboratory testing facilities and a team of highly experienced and qualified mechanical, design, process and chemical engineers, material scientists, physicists, microbiologists and chemists, the company can take any project from concept, through prototype, to production, as well as rationalisation of existing designs.

Stand G14

• Z Corporation 3D technologies help product designers, engineers and architects create the right designs the first time. Professionals use ZPrinter 3D printers, ZBuilder rapid prototyping machines and ZScanner 3D laser scanners to compress the design cycle, generate new concepts, communicate clearly, foster collaboration, and reduce errors. These solutions span the entire 3D CAD/BIM design process from concept through design verification.

Stand J2

• 3DDC specialises in the metal plating of plastic parts with its proprietary Metalise it E process, developed by AT-3D Squared. Supplying quality as standard, for structural and aesthetic benefits to plastic parts, 3DDC has experienced unprecedented growth in the last year with its application portfolio expanding at a similar rate. AT 3D-Squared

offers comprehensive strategic consulting and support services for all aspects of additive manufacturing (AM) technologies. With unparalleled knowledge and experience, the experts from AT 3D-SQUARED bring together all of the components that are vital for maximising the capabilities of AM technologies — software, hardware, materials, local servicing and the human interface.

Stand H13

• Alphaform offers SLA (4 machines) and SLS (2 machines) plus the innovative Metalcoating-technology which makes RP-pieces become real-world-useable parts. In conjunction with the members of the Alphaform group Alphaform Ltd. brings to its customers the broadest range of support from start of development/design up to serial production. We are specialized in small series assemblies including all kinds of surface technologies. Also integration of electronics and fully functional mechanisms is part of our daily business. At TCT 2010 we will present the new material- and time-saving Tetrashell-technology producing bulky parts or parts for foundry applications.

Stand M10

• Materialise will demonstrate how the Magics e-Solution Suite streamlines additive manufacturing set-ups with tailored and integrated software solutions. Visitors can discover how the Magics e-Solution Suite can maximize efficiency, minimize lead-times, automate design processes, remove bottlenecks and boost quality and repeatability. Demonstrations will be available on how MiniMagics2, the recently released free software for STL inspection and compression, can be used to improve rapid product development project communication. Through a collection of physical success cases, Materialise will also showcase how to produce products in low volumes, with minimal investment costs and short lead-times via their groundbreaking low volume manufacturing technologies.

Stand N4

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phil@innovate-design.co.uk

You are a qualified product design engineer with a functional approach to design who can produce high quality, working prototypes. Your ability to resolve technical design issues has probably developed from an in built desire to take products apart and discover how they worked from a young age. You are excited about coming up with new and ingenious ways of solving problems and developing concepts that meet our client's requirements.

You will appreciate the range of project work, the fast pace and the opportunity to work on product development across a range of markets, as part of a dynamic design and prototyping team. You will need at least 3 years experience in product design engineering with experience of electronic development being preferable.

INNOVATE PRODUCT DESIGN

Head of Industrial Design / Product Design / Haircare / Hair Styling / High Tech / R&D / Research & Development

Location: Cambridgeshire Salary: Competitive

Our client is currently seeking a Head of Industrial Design to join their Research & Development team based in Cambridge with regular travel to London and Leeds. The main purpose of this role is to deliver a continuous stream of highly desired, ergonomic and practical designs for products, packaging and visual merchandising (VM) on time and to budget. Within this role your main responsibilities will include developing a strategy and style for delivering the design of products, packaging and VM which is consistent and matches with brand objectives. Working closely with the marketing and technology teams you will develop a new product definition process and create highly desired hair styling product concepts and designs with excellent ergonomics, designing and developing packaging and visual merchandising. You will also be expected to assist in the creation of tooling and transfer into manufacture as well as project management. This will include travel to Hong Kong and China.

The successful candidate will have extensive experience of working in an industrial design role across a variety of industries and design areas including product design, packaging and visual merchandising. You will be highly creative and focussed and be confident enough in your approach to put your ideas forward and ensure that they are listened to. Using your excellent problem solving skills, you will influence well and you will be capable of delegating where appropriate. You will ideally have experience of working within a high tech consumer environment, such as part of a design team in a high technology consultancy.

For full details and to apply for this job go to
www.EurekaJobs.co.uk and type in reference: 327492

READER INTERVIEW

DR PATRICK FINLAY
MANAGING DIRECTOR,
MEDIMATON

60
SECOND



How did you get into the engineering industry?



At school. I had a very forward thinking head teacher and an excellent physics teacher. I had the choice of science or engineering, but decided to become an engineer because I wanted to make a difference. I studied engineering production at Birmingham University, which I really enjoyed, as part of a 1-3-1 sandwich course with Metal Box and joined its graduate trainee programme. I took a line management position with Metal Box as a foreman because I wanted to see what it was like to work on the shop floor. It was very informative, but not very intellectually stretching. I then had a chance to move to ICI Pharmaceuticals. This led to a research fellowship on advanced technology for manufacturing and packaging at the University of Strathclyde, which resulted in my getting a PhD. However, in big companies I felt I was only a small cog in large machines, so I took the chance to move to Fulmer Research at Stoke Poges.



What did you do there?



Some of the projects I worked on as part of teams were to develop a boom for a mobile crane that would be made of composite and a domestic machine for making chapattis.



Where there any other interesting projects?



Most are still covered by client confidentiality, but there was a flame spraying process to make shell structures by depositing polymer in a mould and a vacuum filled airship for an entrepreneur. An airship filled with hydrogen is in danger of catching fire and helium is expensive, but if a structure can be made sufficiently rigid with a lowered air pressure inside, it should still be able to float, but will only implode if it fails. The project got as far as making a demonstrator, but no further.



How did you get into what you are doing now?



There was a call for proposals from the Organisation for Economic Cooperation and Development (OECD) to demonstrate the feasibility of using robots in medicine and

healthcare in 1985. That's where my life changed. I filled in a form on a Wednesday afternoon, the project got funded and we assembled an excellent team of clinicians and engineers, which visited every establishment in the world we could find which was into medical robotics. As result, we produced a report which listed more than 400 possibilities for their use. I then took a deep breath and did a miniature management buyout, setting up Armstrong Healthcare, now ProSurgics, in 1995. The core business was medical robotics with a number of projects. Clearly, in order to survive commercially, we needed to concentrate on just two, which became a laparoscopic camera controller now called FreeHand, which is sold internationally, and a robot for performing image guided brain surgery called PathFinder. Only a very small number of these are so far in use, but with an accuracy of 0.7mm, they allow operations to be undertaken that would not be possible to do any other way. The company reached the point that what it needed most was a skilled leader in selling and marketing, so I stepped down and started to work on some of more than 400 potential applications listed in the report. This has led to my involvement in Personal Lifting, Sagitta Robotics, Therabotica and MediMaton, my consultancy.



How has the industry changed since you first started?



Enormously. At first there were almost no regulations, but now, to most people's enormous relief, there is a strong regulatory framework. To begin with, medical robots were based on general purpose industrial designs, but today they are made for specific tasks, are much smaller, much more intelligent and are sensor rich. When I started, you had to explain that medical robots were not science fiction. Now, they are accepted as essential tools.



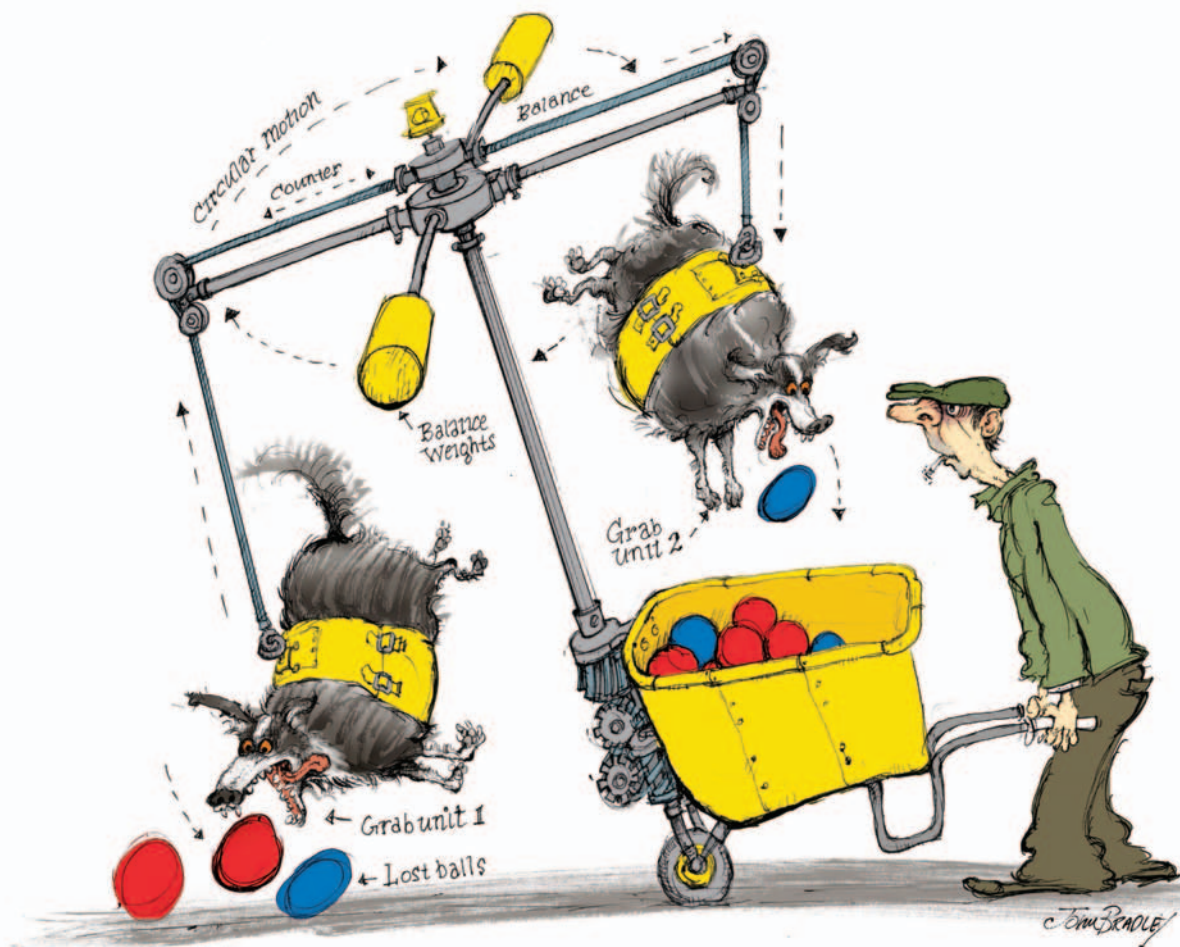
What are the big issues facing the industry?



In medical devices and in engineering generally, Britain has always been very good at research and very poor at development. However, I am still a real believer in British engineering. I am particularly encouraged by the trend to repatriate manufacturing back from the Far East to the UK.

Things are picking up

What goes up must come down. But then it may have to be picked up again. How can this be achieved?



Anyone who has ever used a golf driving range knows that someone, somehow, has to pick up the balls.

This is a matter of cost, since staff have to be paid to go out and collect balls, and the paying punters are not hitting balls and earning money for the business while balls are being collected. Furthermore, while golf balls are fairly easy to pick up, there are in addition, industrial applications where balls have to be picked up and put into bearings.

The Challenge

Our challenge this month is therefore to come up with a mechanical method of picking up large numbers of scattered objects, whether they be large or small,

or used for sport or in industry.

Picking them up by hand is clearly time-consuming, and picking them up with a dustpan and brush is also somewhat tedious, since the picker upper has to bend or squat down, and manoeuvre the pan and brush around the floor to retrieve the objects. One could use a broom to sweep up balls on a smooth floor, but such a solution is unlikely to work well on grass.

What is needed is something simple that can be pushed along and allows the balls to be quickly gathered up. Some kind of vacuum cleaner would do it, but would in our opinion, constitute overkill as would making and using a swarm of small, mobile, electronic robots. There is however, an

invention which we have seen demonstrated that solves the problem most elegantly and looks to be inexpensive to manufacture. Once you see it, you may consider it obvious, except that it is innovative enough to be protected by patent. The invention will be described fully in our October edition. See if you can come up with anything better.

The answer to last month's Coffee Time Challenge of how to design a wave-powered boat can be found in our Technology briefs section on page 8

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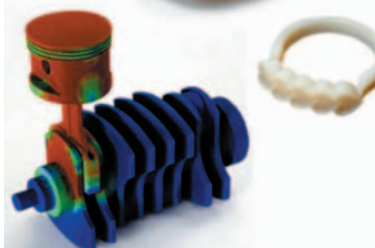
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Loctite 5188 is a new anaerobic sealant that copes with the increasing levels of micro-movements that occur within general industry applications, as well as the engine and gearbox environments of motor vehicles.

This product is an important development because traditional anaerobics do not always provide the flexibility needed for some of these high torque situations.

The sealant is applied as a thin film using a robot, roller or a screen printer - all of which can be supplied by the Henkel Equipment Department.

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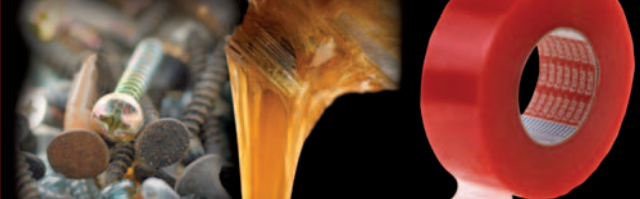
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WS2 works well from -273° to 450° C and down to 10-14 Torr. WS2 has been applied to bearings and gears to extend life.

Design Out maintenance problems with WS2!

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Dowel Bushings

Spirol Dowel Bushings Improve Oil Pump Assembly Performance

A standard off the shelf Dowel Bushing from Spirol Industries has been specified to replace two solid ground wall dowels used to align the two side covers of the body of an oil pump assembly. The Spirol solution has provided the manufacturer with the lowest installed cost, reducing the cost per dowel by almost 50% and providing major savings in overall manufacturing costs.

In the original design, the use of a ground dowel required a precise, accurate hole that had to be reamed to the proper dimension - a secondary operation that added cost to the assembly but was essential to prevent damage to the oil pump housing. In a worst case scenario with the dowel bushing keeping the assembly together, the pump could be assembled on a vehicle, and due to "play" in the bushing and housing, it would fail.

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Electric Atomisers

Fine Droplets without High Pressure

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

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

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Flowmeters

Titan's Breakthrough in Small Bore Flow Metering

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

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

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

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www.flowmeters.co.uk

Gearboxes

Davall Stock Gears introduce two ranges of standard gearbox, specifically designed for harsh environments applications.

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The two styles of gearboxes have a large choice of reduction ratios available, worm series (right angle) from 7:1 up to a nominal 100:1, and helical series (co-axial) from 3:1 up to 60:1, with power ratings up to 4Kw.

Worm gearboxes



Coaxial gearboxes



www.davall.co.uk

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☎: 01707 283131

Laser Marking

Laser Marking Delrin Cases to Aid Product Traceability

Laser Marking Delrin®, is a relatively easy task as CO2 lasers produce nicely engraved marks on most plastics. However, in this application the customer used a swatch of green ink to mark the cathode (negative side) of each LED case - as seen in the example. Highly contrasting text marks were obtained that are readable by the naked eye; the 0.020" high text string was marked using 6 watts of power at a speed of 15 inches per second in a cycle time of 60 milliseconds per part.

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Light Curtain Technology

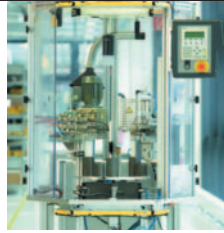
Innovative Sick Light Curtain Widens Safety Applications

SICK (UK) is extending the benefits of its innovative miniTwin light curtain technology to a much wider audience, with the launch of the miniTwin 2, a cost-effective solution that meets level 'd' / SIL2 safety requirements.

The latest addition to the miniTwin family, the miniTwin 2 incorporates sender and receiver elements in a single miniature housing for continuous end-to-end field coverage.

SICK (UK) safety specialist, Seb Strutt, commented: "The miniTwin 2 provides a unique solution where traditional light curtains would be too big and awkward to install. It means that light curtain protection can be extended to a wide range of new applications and configurations, at a competitive price point."

@: Andrea.hornby@sick.co.uk
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www.sick.co.uk

Machine Vision Solutions

New Dalsa Compact Vision PC Provides Cost Savings for Multiple GigE Camera Applications

The new GEVA (GigE Vision Appliance) is the latest in DALSA's versatile platform of machine vision solutions. These include multi-camera embedded systems and smart cameras, all operating under common imaging software. GEVA is a powerful embedded system designed for applications requiring powerful processing, high-resolution or multiple cameras. GEVA benefits from a smaller size for easier system integration and from a powerful dual core processor, equipped with high-speed memory resources to tackle the most demanding imaging applications.

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Additionally every motor is available as a low resistance (LR) motor perfectly suited for low voltage battery applications.

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Patented Solution for Diaphragm Break Monitoring

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The diaphragm break monitoring for diaphragm seals can be implemented on a wide range of instrument variants throughout Wika's pressure instrument range.

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Silicon pressure sensors

Latest silicon pressure sensors show huge improvements

The historical problems associated with silicon oil-filled pressure sensors are well documented. However, recent advances in sensor design has led to improved versions that overcome many of these disadvantages.

In order to solve these issues, the latest silicon pressure sensors use much-improved mechanically-sealed designs, which use only a fraction of the volume of oil compared to previous versions. This means that even if any air does get through to the oil, there is less oil and so the effects of temperature fluctuations on the oil are much less, which results in more reliable measurement performance and improved thermal stability. The effects are not completely eliminated but are greatly reduced compared to conventional versions.

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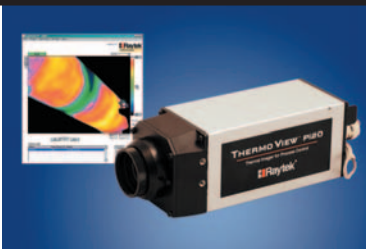
Thermal Imaging

Raytek® Introduces ThermoView™ Pi20 & DataTemp® Pi Process Imaging Solution

Simplified thermal imaging expands real-time view of industrial process performance.

August 2010 — Raytek®, a leading worldwide provider of infrared (IR) thermometry and maker of the industry-leading ThermoView Ti30 infrared camera, has introduced the ThermoView™ Pi20 process imager and DataTemp® Pi (DTPi) software. This easy-to-use thermal imaging solution provides an expanded view of process performance in a wide range of industrial applications.

@: info@raytek.de
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www.raytek.com

Torque Tester

A Turnaround In Pump Dispenser Quality

Torque tests, performed on pump dispensers, are helping one German manufacturer check seal quality to optimise their production.

Pfeiffer wanted to quantify the correct level of torque required to seal pump dispensers, commonly used within their dosing systems and atomisers in the pharmaceutical and cosmetics industries. A former customer of Mecmesin and, therefore, familiar with their products, Pfeiffer contacted the company again for this new application. It was critical to gain accurate data to prevent incorrect settings being applied on the production line, as this would result in poor performance of the pump dispenser and possible leakage of the container contents.

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