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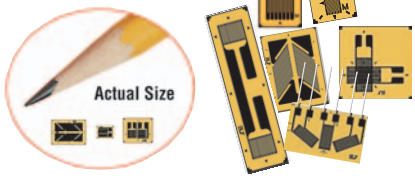

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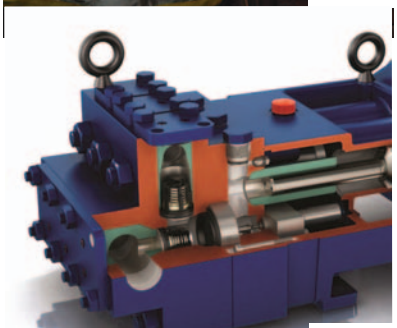

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70 kHz Confocal Controller with Ethernet interface

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Micro Epsilon has launched a new industrial grade confocal controller for OEM, machine builders and R&D applications. With Ethernet interface, encoder input triggers for synchronisation and many programmable features including multi-peak software calculation integrated into the controller, this device is truly outstanding.

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Small and medium, but why not large?

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

In this issue, Blair Hutton, who has fulfilled the role of Design Ambassador for the Institution of Engineering Designers recently, revealed how pleasantly surprised he has been to discover just how much innovation takes place in small companies in the UK.

Having spent his career prior to taking the role with the IED working for illustrious names like Jaguar Land Rover, Ford and Dyson, Mr Hutton can perhaps be forgiven for not having appreciated the fact that bigger does not always mean better when it comes to innovation, but this is far from being news to those of us at *Eureka*.

The Small to Medium sized Enterprise (or SME) is very much the beating heart of UK engineering innovation, something recognised in the Government's Innovation and Research Strategy for Growth published at the end of 2011, which promised £75m of funding distributed through the Technology Strategy Board to help SMEs develop new products.

Of course, the paradox is that while, by virtue of their size and flexibility, smaller companies are often better placed to innovate than their larger counterparts, their size also tends to restrict their ability to exploit that innovation as successfully. This is the reason we see so much innovation and intellectual property migrate to big (often overseas-based) companies that are better able to translate that innovation into cold, hard cash.

So while it is right to hail the innovation and success of this country's SMEs, it is also necessary to ask what it is that means so few companies parlay their technical expertise and innovation into developing a status as large-scale, global players? Whether the problem is structural, political or financial, it is surely past time it were addressed if we are truly to rebalance the economy?

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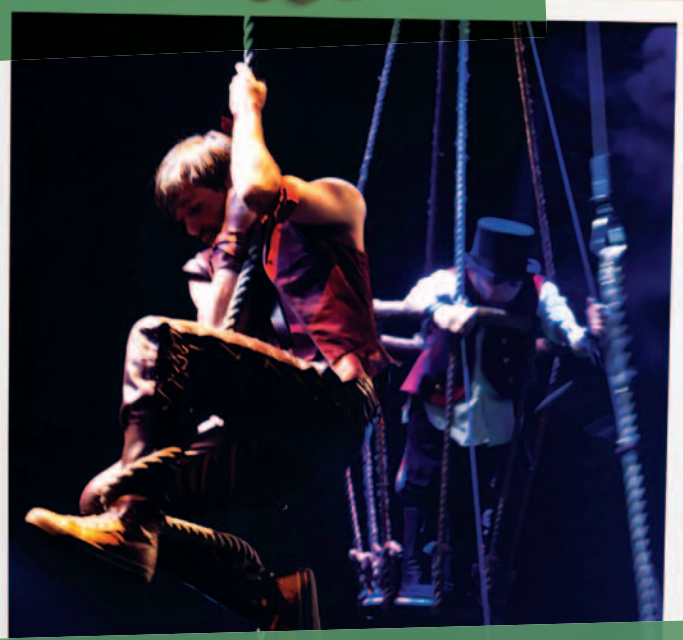

Gill Stephenson
Senior Automation Engineer,
Royal Shakespeare Company

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Government announces Higher Apprenticeships in engineering

The Government has announced plans to create an additional 4,230 Higher Apprenticeships in sectors including aviation, low carbon engineering and space engineering.

The news has been welcomed by industry and employer organisations such as the CBI and the EEF. "By radically increasing the number of degree level apprenticeships, we are putting practical learning on a level footing with academic study," said Skills Minister John Hayes. "Doing an apprenticeship should be one of the best gateways to university level study. Through the Higher Apprenticeship Fund we are creating 23,000 places for young people to take degree-equivalent Higher Apprenticeships in sectors like space engineering and renewable energy."

At the CBI, director for employment and skills Neil Carberry said that building a higher-level skills base had to be an essential part of a successful plan for long term growth. He commented: "Future skills shortages in key sectors could hold back our economic performance, so boosting higher level apprenticeships now is the right thing to do. Sectors like high-technology and science-based advanced manufacturing and IT are a good place to start.

"Young people need to know that Higher Apprenticeships are a great route to a successful career, as they can build higher level skills while learning on-the-job with an employer."

Tim Thomas, head of employment affairs and the manufacturers' organisation EEF, welcomed Government efforts to increase the number of opportunities available. He said: "Employers view vocational and academic qualifications and skills as complimentary to one another, and Higher Apprenticeships are becoming a hybrid of both. As such they provide a viable solution to employers' increasing desire for practical and academic skills.

Robots use touch to identify materials

A tactile robotic finger that can outperform humans in identifying a range of natural materials could pave the way for advancements in prostheses and personal assistive robots.

Developed by a team from the University of Southern California, the robot utilises a tactile sensor designed to mimic the human fingertip. It also features a newly designed algorithm that helps it make decisions about how to interpret the outside world by imitating human strategies.

Capable of other human sensations, the researchers say the sensor can tell where and in which direction forces are applied to the fingertip and even the thermal properties of an object being touched.

Like the human finger, the BioTac sensor has a soft, flexible skin over a liquid filling. The skin even has fingerprints on its surface, greatly enhancing its sensitivity to vibration. As the finger slides over a textured surface, the skin vibrates in characteristic ways. These vibrations are detected by a hydrophone inside the bone-like core of the finger. While the human finger uses similar vibrations to identify textures, the robot finger is said to be even more sensitive.

The researchers trained the robot on 117 common materials gathered from fabric and stationary shops. When confronted with one material at random, the robot was able to correctly identify the material 95% of the time after intelligently selecting and making an average of five exploratory movements. It was only rarely confused by pairs of similar textures which human subjects could not distinguish at all.

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Briefs

beea
british engineering excellence awards

BEEAS COUNT DOWN TO ENTRY DEADLINE

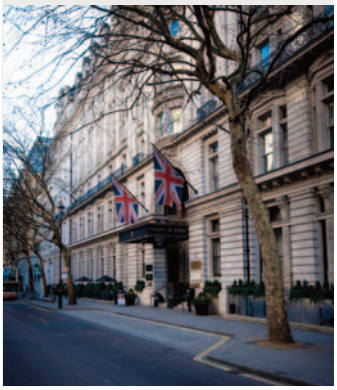
Time is running out to enter the 2012 British Engineering Excellence Awards. With the deadline for entries due to expire on 31st July, those wishing to enter need to act quickly.

Now in their fourth year, the BEEAs are organised by Findlay Media with the intention of celebrating the achievements of the UK's design engineers. The Awards recognise the achievements of those companies that have shown design innovation within the last year and highlight the important contribution of the engineers who made these innovations possible.

Categories for the BEEAs include: Consultancy of the Year; Design Engineer of the Year; Design Team of the Year; Green Product of the Year; Materials Innovation of the Year; New Mechanical Product of the Year; New Electronic Product of the Year; Small Company of the Year; Start Up of the Year; and Young Design Engineer of the Year.

The Awards ceremony itself will take place on 25th October at 8 Northumberland Place, London.

To enter, please go to www.beeas.co.uk and click on 'How to Enter'



New design could provide cheaper, thinner solar cells

Researchers from North Carolina State University in the US have found a way to create much slimmer thin film solar cells without sacrificing the cells' ability to absorb solar energy. The breakthrough, they believe, could significantly decrease manufacturing costs for the technology.

According to Dr Linyou Cao, an assistant professor of materials science at the university, the efficiency is owed to a 'nanoscale sandwich' design with an ultra thin 'active' layer. "We created a solar cell with an active layer of amorphous silicon that is only 70nm thick," she explained. "This is a significant improvement, because typical thin film solar cells currently on the market that also use amorphous silicon have active layers between 300 and 500nm thick. The 'active' layer in thin-film solar cells is the layer of material that actually absorbs solar energy for conversion into electricity or chemical fuel. The active layer is sandwiched between layers of dielectric material. The technique we've developed is very important because it can be generally applied to many other solar cell materials, such as cadmium telluride, copper indium gallium selenide, and organic materials."

The technique relies largely on conventional manufacturing processes, but is said to result in a very different finished product. First, the researchers created a pattern on the substrate using standard lithography techniques. The pattern outlines structures made of transparent, dielectric material measuring between 200 and 300nm. Researchers then coated the substrate and the nanostructures with an extremely thin layer of active material, such as amorphous silicon. This active layer was then coated with another layer of dielectric material.

According to Cao, using dielectric nanostructures beneath the active layer created a thin film with elevated surfaces evenly spaced all along the film.

"One key aspect of this technique is the design of the 'nanoscale sandwich,' with the active materials in the middle of two dielectric layers," she said. "The nanostructures act as very efficient optical antennas, focusing the solar energy into the active material. This focusing means we can use a thinner active layer without sacrificing performance. In the conventional thin film design, using a thinner active layer would impair the solar cell's efficiency."

www.usc.edu

Speakers confirm for Engineering Design Show

With stands for the Engineering Design Show fully-booked and registration now open, organiser Findlay Media is now able to announce some of the speakers who will grace the Engineering Design Show Conference.

Being held concurrently with the Engineering Design Show, the Conference programme is designed to offer delegates an opportunity to hear about the latest technologies, techniques and strategies employed by experts at the forefront of their fields.

Confirmed Conference speakers will include Sir George Cox, the past Chairman of the Design Council and the author of the Cox Review on creativity in business for the UK government. He is currently president of the Institution of Engineering Designers and will speak on the importance of engineering design to the UK economy.

Also speaking will be James Baker, managing director of BAE Systems Advanced Technology Centre, whose subject matter will be 'Innovation in design – how to work smarter'. In addition, Tim Strafford of McLaren Electronic Systems will explain the challenges involved in designing and manufacturing an F1 engine control unit.

The delegate places for conference sessions are limited to 100 attendees per session. If you are interested in attending one of the sessions below and wish to reserve your place, then register online now to avoid disappointment.

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www.engineeringdesignshow.co.uk

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Briefs

FILAMENT TAPES PUT STRENGTH AT A PREMIUM

tesa has extended its high-strength filament tape offering with a range of premium tapes designed to provide even higher levels of tensile strength and abrasion resistance in combination with tear resistance and high adhesion properties. Resisting breakage or tearing under tensile stress is one of the most important properties of materials used in fixing, securing and sealing goods in applications such as palletising, bundling, end tabbing, transport securing and carton sealing.

tesa's premium filament tapes provide an essential tool where safety matters. With an impressive elongation before failure of 15% they also offer extremely high tensile strengths from 500 N/cm with tesa 4595, 750 N/cm on tesa 4597 and 1,000N/cm with tesa 4599.

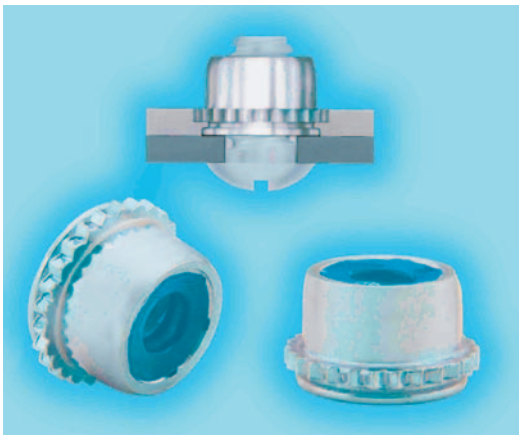
www.tesa.co.uk

Self-locking fasteners prevent loosening

PEM nylon insert self-locking fasteners provide a reusable, non-metallic prevailing torque thread lock to prevent threaded mating hardware from loosening in service due to vibration or other application-related forces. Their blue nylon hexagonal locking element (black for metric types) ultimately eliminates potential galling, any need for lubricant, or the use of chemical locking methods or patches.

Types include PL (steel) and PLC PEMHEX (stainless steel) self-clinching fasteners and Type CFN steel broaching fasteners. All install permanently in thin metal sheets and their reliable threads easily accommodate mating hardware during final attachment of components.

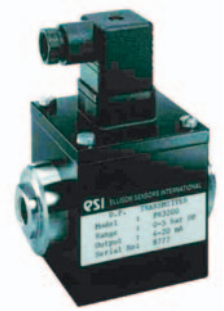
The threadlocking performance of Type PL and PLC fasteners is equivalent to applicable NASM25027 specifications. A strong, knurled collar receives the installation force and resists torque, exhibiting spin resistance greatly exceeding the torque that can be exerted by the self-locking feature. Both the self-



clinching shank and undercut contribute to high pushout values. They can install in aluminum or steel sheets as thin as .040" to .070"/1mm to 1.78 mm and are offered in thread sizes from #4-40 through #10-32 and M3 through M5.

www.pemnet.com

Improved differential pressure sensor



Ellison Sensors has re-engineered the PR3200 differential pressure sensor to include full SoS (Silicon on Sapphire) sensing technology and titanium pressure ports.

The changes will make the already versatile sensor suitable for the more arduous and challenging applications found in industrial and process markets.

Applications include static differential pressure measurement and control in combustion chambers and clean rooms, also condition monitoring and filter monitoring in high pressure hydraulic systems or any application for liquid or gas requiring reliable differential pressure measurement, even with aggressive media.

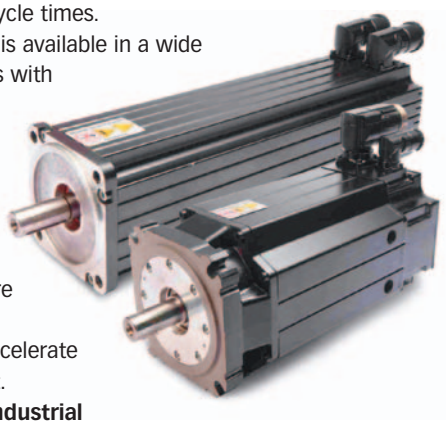
www.oem.co.uk

Servo motors meet higher dynamic needs

Moog's new MD Series servo motor addresses the evolving needs for higher dynamics through increased angular acceleration (ratio of peak torque to inertia) and higher performance in industrial applications.

This servo motor series enables machine builders and end-users in industries such as plastics, die casting, metal forming machinery and presses, food and beverage processing equipment and other industrial production machinery to increase productivity and machine performance through improved cycle times.

The servo motor is available in a wide range of flange sizes with natural and liquid-cooled options. The modular design and characteristics of the motor is maintained throughout the entire range which helps machine builders accelerate their time to market.



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Briefs

MINIATURE LINEAR DRIVE CUTS WEIGHT

The drylin SLN-27 miniature linear axis from igus UK is made with polymer bearings and an optional NEMA 11 certified motor. Developed specifically for simple handling tasks in confined spaces, this high-performance miniature linear drive offers design flexibility for positioning small loads.

The drylin SLN-27 miniature linear axis is based on the proven technology of drylin N27 linear guide system and the linear rail is made of durable anodised aluminium. The plastic module has high wear resistance, is maintenance-free, self-lubricating and corrosion-resistant, providing a 'fit and forget' solution. With compact dimensions of only 22mm high by 28mm wide, it is suitable for low load sensor adjustments and feed mechanisms, as well as lightweight handling tasks such as those found in laboratory equipment.

As almost all of the components used in the drylin SLN-27 linear unit are made of either plastic or aluminium, the system is extremely robust and lightweight. The carriage is driven by a 5mm trapezoidal or high-helix thread leadscrew and is available in a range of pitches from 0.8mm to 5mm.

www.igus.co.uk

igus will be exhibiting at the Engineering Design Show taking place from 10th-11th October.

Engineering design show

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Wave springs take the weight off runners' feet

Smalley flat wire wave springs are being used by shoe manufacturers for cushioning in the soles of footwear.

The wave springs from TFC are used because of their space-saving abilities and lightweight design compared to conventional coil springs. Wave springs, which typically operate at half the height of conventional coil springs, provide an accurate repeatable load in both the heel and ball of shoes. A single 'Crest-to-Crest' Wave Spring in the heel and two parallel wave springs in the ball of the shoe absorb the impact on joints associated with athletic activities.

The springs, manufactured in corrosion resistant 17-7 stainless steel, were specifically designed to handle the extensive cycle life that is associated with the wear of the shoes. Smalley Wave Springs offer accurate, repeatable loads for the duration of the spring life, which is designed to outlast the life of the shoe itself.

Using the same method of manufacture, TFC Spirolox retaining rings offer a space-saving alternative to conventional circlips.

www.tfc.eu.com

Solution to last month's Coffee Time Challenge

The solution to last month's Coffee Time Challenge to come up with a handheld device which can be used to roll anything from rolls of paper to trains comes from German company Easy Roller.

Its 'Easy Roller' weighs just 9kg, can be operated single-handed and uses an air motor. The innovative design acquires its power from the net mass of the equipment needed to be rolled. By positioning it in front of the equipment (a heavy roll of cable for example) it uses two rubber rollers over which the drive roller is positioned. When the valve handle is pressed down, the air motor starts enabling the drive roller's chain-controlled backward motion.

An air vane motor powering the drive roller is a small, compact powerhouse, which was developed and designed by Deprag Schulz. The main benefit is its high performance density. Depending on the model, the roller only requires a-fifth of an electric motor's net mass and is one third the size. The power is continuously controlled by throttling the air volume and the motor will never be overloaded. It withstands additional strains until brought to a standstill and runs effortlessly afterwards. This process can be carried out as many times as required.

Andreas Hufmann, managing director of Easy Roller, says: "Moving objects with the help of 'Easy Roller' increases safety for employees and decreases the chance of industrial accidents due to improper manoeuvring."

www.easyroller-company.com

www.deprag.com

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Engineering design show

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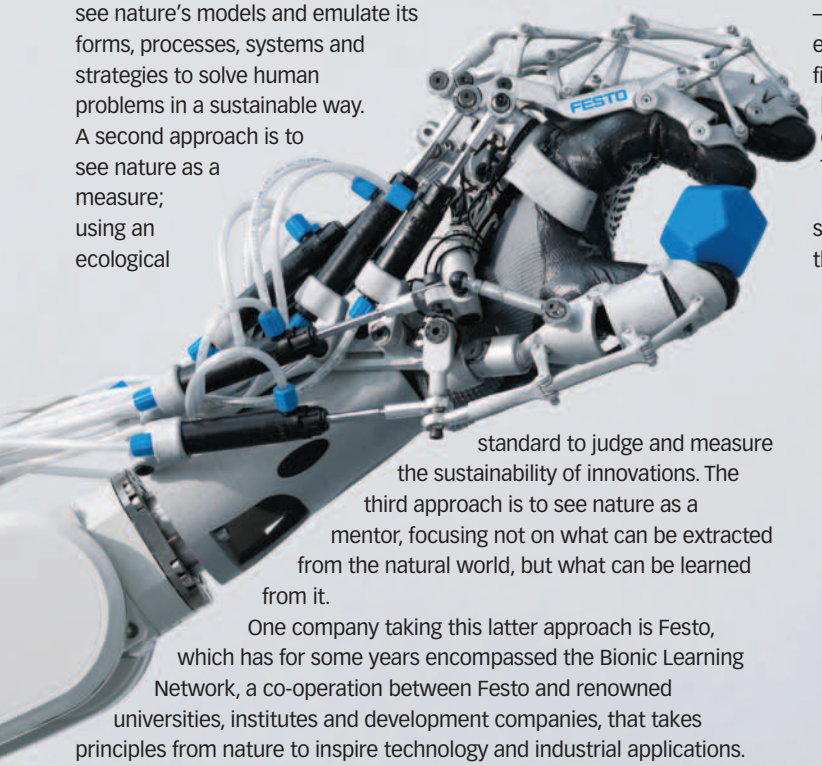
Inspired by nature

From gecko-based adhesives to spider-inspired robots, biomimicry is enabling the design of more sustainable, intelligent and efficient systems. Laura Hopperton reports.

Animals, plants and microbes are in a constant state of change as they adapt and evolve to fit with the world around them. This has always meant that they offer a source of inspiration to those attempting to develop machines, systems and products that help humans adapt to our environment.

Increasingly, though, biomimicry (a design philosophy that builds on Mother Nature's own 3.8 billion-year research and development programme) is becoming an ever stronger influence on engineering design. From imitating the way geckos stick to walls or hummingbirds hover, the process of taking nature's best ideas and adapting them for human use is becoming increasingly common practice.

There are a number of different approaches to biomimicry. One is to see nature's models and emulate its forms, processes, systems and strategies to solve human problems in a sustainable way. A second approach is to see nature as a measure; using an ecological standard to judge and measure the sustainability of innovations. The third approach is to see nature as a mentor, focusing not on what can be extracted from the natural world, but what can be learned from it.



One company taking this latter approach is Festo, which has for some years encompassed the Bionic Learning Network, a co-operation between Festo and renowned universities, institutes and development companies, that takes principles from nature to inspire technology and industrial applications.

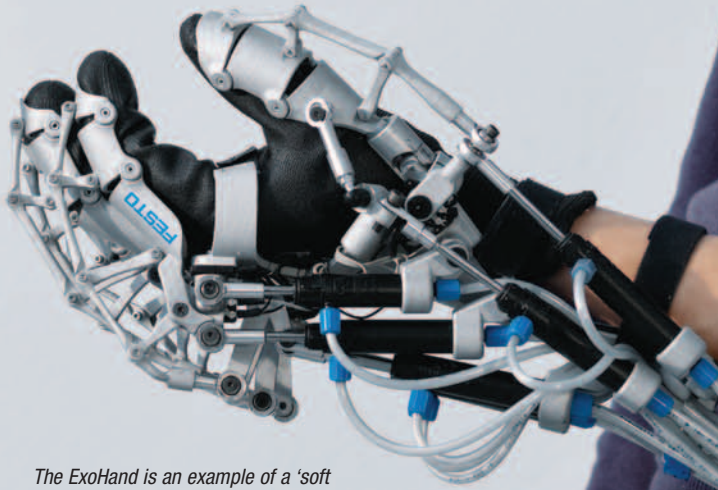
Over the years, the Network has produced a number of eyecatching initiatives that have not only garnered publicity, but have also fed back technology and techniques into industry. These have include a biomechatronic handling system modelled on an elephant's trunk and a pneumatic drive inspired by the fluidic muscle in the human arm.

Elias Knubben, head of corporate bionic projects at Festo, says of this initiative: "In industry, criteria such as flexibility, weight and energy efficiency are acquiring increasing significance. Optimised over billions of years, nature shows in a variety of ways how maximum performance can be achieved while using minimal energy consumption and as few materials as possible. Our aim is not to copy nature, but to learn from it and take inspiration from its vast pool of highly efficient, smart solutions."

One of the Bionic Learning Network's most recent developments is an innovative assistance system inspired by the strength and flexibility of the human hand. The ExoHand concept is a solution for future human/machine co-operation in industrial environments based on 'soft robotics' – robot systems that closely reflect biological organisms. It is designed to meet the challenge of an ageing population by functioning as an assistance system for assembly tasks in production. As a force feedback system, Festo claims it can extend people's scope of action in production environments and can also be used as a platform for the development of new applications in service robotics, as well as personal assistance systems.

"Worn like a glove, the ExoHand is designed to support the human hand from the outside to reproduce the physiological degrees of freedom – the scope of movement resulting from the geometry of the joints," explains Knubben. "Eight double-acting pneumatic actuators move the fingers so that they can be opened and closed. For this purpose, non-linear control algorithms are implemented on a CoDeSys-compliant controller, which allows precise orientation of the individual finger joints. The forces, angles and positions of the fingers are tracked by sensors."

According to Knubben, the fingers can be actively moved and their strength amplified with the operator's hand movements transmitted to the robotic hand in real time. The objectives are to enhance the strength



The ExoHand is an example of a 'soft robotics' system that mechanically reflects a biological system

Javier Fernandez (far right) and Donald Ingben display Shrilk, which potentially represents a biodegradable alternative to plastic

and endurance of the human hand, to extend scope of action and to secure an independent lifestyle for users at an advanced age.

Another recent innovation is the NanoForceGripper, which uses suction components modelled on the footpads of a gecko. A key component is a foil on the underside of the gripper with 29,000 adhesive elements per square centimetre. These sucker-like elements adhere securely and permanently to the surfaces of the object to be handled. This effect is due to extremely small intermolecular forces of attraction known as 'van der Waals forces'.

A counteracting force 'peels' off the gripper using Festo's Fin Ray Effect (modelled on the tailfin of a fish). When this force is applied, the flat structure is deformed into a curved surface. The effective foil-coated gripping surface becomes increasingly small, and the gripped component is gently released.

According to Knubben, the NanoForceGripper can grip especially delicate objects with a smooth surface such as glass using virtually no energy. "It's another example of how Festo is transferring nature's optimisation principles to develop new technological methods and innovation processes that can be put to use in automation," he says.

Designing differently

Festo is far from being the only body using nature as a model, however. Researchers at Harvard University's Wyss Institute for Biologically Inspired Engineering have developed a cheap, biodegradable, biocompatible material called Shrilk, which they believe could one day provide a more environmentally-friendly alternative to plastic.

Designed to replicate the exceptional strength, toughness and versatility of insect cuticle, the material is called Shrilk because it is composed of fibroin protein from silk and from chitin, which is commonly extracted from discarded shrimp shells. It is thin, transparent, flexible, and according to postdoctoral fellow Javier Fernandez, as strong as an aluminium alloy at half the weight.

"A natural insect cuticle, such as that found in the rigid exoskeleton of a housefly or grasshopper, is uniquely suited to the challenge of providing protection without adding weight or bulk," Fernandez explains. "As such, it can deflect external chemical and physical strains without damaging the insect's internal components. Also remarkable is its ability to vary its properties, from rigid along the insect's body segments and wings to elastic along its limb joints."

An insect cuticle is a composite material consisting of layers of chitin, a polysaccharide polymer and protein organised in a laminar, plywood-like structure. Mechanical and chemical interactions between these materials provide the cuticle with its unique mechanical and chemical properties. By studying these complex interactions and recreating this unique

Spiderbot takes on hazardous missions

A computer-controlled, 3D printed bionic robot modelled on the same principle that moves spider legs has been developed by a team from the Fraunhofer Institute for Manufacturing Engineering and Automation in Germany. Designed to track and relay emergency responders in hazardous situations, the novel eight legged prototype mimics the way a spider builds up high levels of body pressure to pump fluid into their limbs to extend them.

Not only does the design give it the agility and stability of real spiders when getting around on the ground, it also features hydraulically operated drive bellows that serve as joints and allow it to jump. Like its biological counterpart, the spiderbot is extremely stable, keeping four of its legs on the ground at any one time while the remaining four legs turn and ready themselves for the next step. Diagonally-opposed members can also move simultaneously and bending the front pairs of legs pulls the robot's body along, while stretching the rear legs pushes it.

To get it to jump, the researchers fitted the spiderbot's 8" legs and its body with pneumatically-operated elastic drive bellows that bend and extend its legs.The components required for locomotion, such as the control unit, valves and compressor pump, are all located in the robot's body, which can also be fitted with various measuring devices and sensors, depending on the application.

chemistry and laminar design in the lab, Fernandez and Wyss Institute director Donald Ingber were able to engineer a thin, clear film that has the same composition and structure.

"A major benefit of Shrilk is its biodegradability," Fernandez comments. "Plastic's toughness and mouldability represented a revolution in materials science during the 1950s and '60s. Decades later, however, the material is raising questions about how appropriate it is for one-time applications such as plastic bags. The great thing about Shrilk is that not only will it degrade in landfill, but its basic components are used as fertiliser, so it will enrich the soil."

In addition, Fernandez says Shrilk can be produced at a very low cost, since chitin is readily available as a shrimp waste product. It is also easily moulded into complex shapes, such as tubes. By controlling the water content in the fabrication process, the researchers have even been able to reproduce the wide variations in stiffness.

These attributes could have multiple applications. As a cheap, environmentally-safe alternative to plastic, Fernandez says Shrilk could be used to make rubbish bags, packaging and nappies that degrade quickly. As an exceptionally strong, biocompatible material, it could also be used to suture wounds that bear high loads, such as in hernia repair, or as a scaffold for tissue regeneration.

"When we talk about the Wyss Institute's mission to create bio-inspired materials and products, Shrilk is an example of what we have in mind," says Fernandez. "It has the potential to be both a stepping stone toward significant medical advances and a solution to some of today's most critical environmental problems."

One such environmental problem, that of getting water to crops in areas of extreme drought, was addressed recently by Australian engineer Edward Linacre, whose beetle-inspired irrigation system won the 2011 James Dyson Award.

Called Airdrop, the concept is a low-cost, self-powered pump and underpipes system designed to deliver water to the roots of crops in the most arid places on Earth. To create it, Linacre studied the Namib beetle's ability to survive by consuming the dew it collects on the skin of its back in the early mornings. He says: "The concept was born out of the droughts that have blighted Australian farmers. I found the solution in an unusual source – the Namib beetle. It lives in dry deserts, but produces water to drink by condensing liquid on its hydrophilic back."

The Airdrop system mimics this survival technique by harvesting moisture from the air and turning it into condensation. A turbine intake drives air underground through piping that rapidly cools the air to the temperature of the soil, where it reaches 100% humidity and produces water. The water is then stored in an underground tank and pumped through to the roots of crops via sub-surface drip irrigation hosing.

However, while Linacre makes no secret of the biological inspiration behind his design, he does sound a note of caution, pointing out that biomimicry is only the first step. "The natural world doesn't engineer conventional solutions to problems," he says. "Finding inspiration from nature is a great start, but it's only one part of the process. Once you have your idea, prototype, test and redesign – improving the design by going back to the drawing board again and again."

Even so, there is little doubt that nature has much to teach engineers and inventors. As Sir James Dyson concluded when giving Linacre his award: "Biomimicry is a powerful weapon in any engineer's armoury. Airdrop shows how simple, natural principles like the condensation of water can be applied to good effect through skilled design and robust engineering."

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The Airdrop pump takes inspiration from the Namib beetle's ability to extract water from the air

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The design ambassador

What impressions has the man who has spent much of the last year promoting design engineering gained of the sector? Paul Fanning finds out.

It seems a paradox that a year spent away from practical, hands-on engineering could give you a much-improved perspective on the world of engineering. Even so, this would seem to be the experience of the man who has spent the last year as the 'design ambassador' at the Institution of Engineering Designers.

With extensive experience in design engineering working for Ford, Jaguar and Dyson, the decision to take up the role of design ambassador was not taken lightly by Blair Hutton. He says: "It was originally designed as a sabbatical position, but I wasn't able to negotiate a sabbatical at the time, so I had to take a leap of faith and just go off and do it."

As he nears the end of his term as Design Ambassador, then, does he feel the leap has been worth making? "I'm glad to say that the decision has been taken to appoint a successor," he says, "which wasn't necessarily the case in the first place, so that would seem to suggest that the IED feels it's been a successful move... So that seems like a nice testimonial."

The role itself was far from being clearly defined, being a new position for the IED. This, claims Hutton, had its upsides and downsides. He says: "It was quite nice in a way that there was no precedent. On the one hand it was quite scary because there was nothing to go on – just a vague brief. On the other hand, it meant I got to define the role.

"Being an engineer," he continues, "I usually appreciate being given a tight specification for a job and working within a set of constraints, but suddenly there was just this vague notion of 'you can just go off and make some noise in whatever form you wish'."

The role had two key pillars: promoting a career in design engineering to people in academia and promoting professional registration with the Institution. The value of the latter, he concedes, is not widely understood by most engineers and this has to some extent been reflected in the response he has met.

"I have to say that you do get a degree of cynicism coming from engineers who can't see what's in it for them," he says. "That's been one of the biggest challenges, trying to convince them it's relevant to them and there's no greater satisfaction than when the guy who's been at the back of the room with his arms folded shaking his head applies for registration."

Hutton believes that, far from being a purely cosmetic exercise, registration with an institution such at the IEDis a way of validating the role of engineers while also offering the individual a range of benefits. He says: "Because in this country we don't protect the title of engineer, then the only way of setting yourself apart is by getting registered. That is often the only way to establish and advertise the point you have reached in your career and the work you have done to get there. More tangible benefits come in the form of career progression, status and salary. I always suggest that engineers go off and do their homework and look at the way in which salaries favour those who are registered over those who aren't."

The other aspect of Hutton's role, of course, lies in educating those currently o vS|Zvxn academic courses about the attractions and rewards of pursuing a career in design engineering and in preparing them for the realities of the workplace.

He is highly aware that the greatest danger with regard to engineering students lies in them completing their course only to migrate to other – perhaps more lucrative – industries. He says: "The pitch there is to impress upon them the fact that they can go on to have

A leader in his field

Blair Hutton's CV reads like a 'Who's Who' of UK engineering, with stints spent working for Ford, Jaguar Land Rover and – as exemplified by this image – Dyson. Following his time as IED design ambassador, he will take up a role with Edinburgh-based design consultancy, Shore Design.

Photograph: Charles Milligan

a really satisfying and fulfilling career in design engineering rather than graduating and going off to do something completely different. When I was on my course, a lot of people did that. 30 of us started and, by the end, only two or three went on to do something in engineering. So I try to impress on people that you can have a career that's rewarding while staying in engineering."

The role has given Hutton some interesting perspectives on engineering in the UK over the last year. Indeed, he claims to have been surprised by the positive impression he has gained from the industry despite hard economic times. "I think the thing that has really surprised me," he says, "has been the number of small, but very innovative companies who are doing wonderful work, ploughing their own furrows and just getting on with things very successfully… It's been brilliant to find members working in small companies or even as one man bands. The output, in many cases, is much more cutting edge than what is coming out of larger companies. I found that design engineering in the UK is both more diverse and in a healthier state than I had perhaps imagined."

The academic picture, too, he has found to be rosier than he'd anticipated. He says: "There are now 400 courses doing industrial design or related topics. I found it really encouraging to discover just how many students there were working in this area."

Overall, Hutton's take on the UK design engineering sphere is positive. He says: "I definitely think things are going the right way. I feel there's a sort of snowball effect going on. It used to be pretty negative, but now with things like the Queen Elizabeth Prize and large-scale projects such as Bloodhound, the Olympics and HS2, I hope there are the sort of projects that will both encourage people to enter and stay in the profession and raise the profile of design engineers in general."

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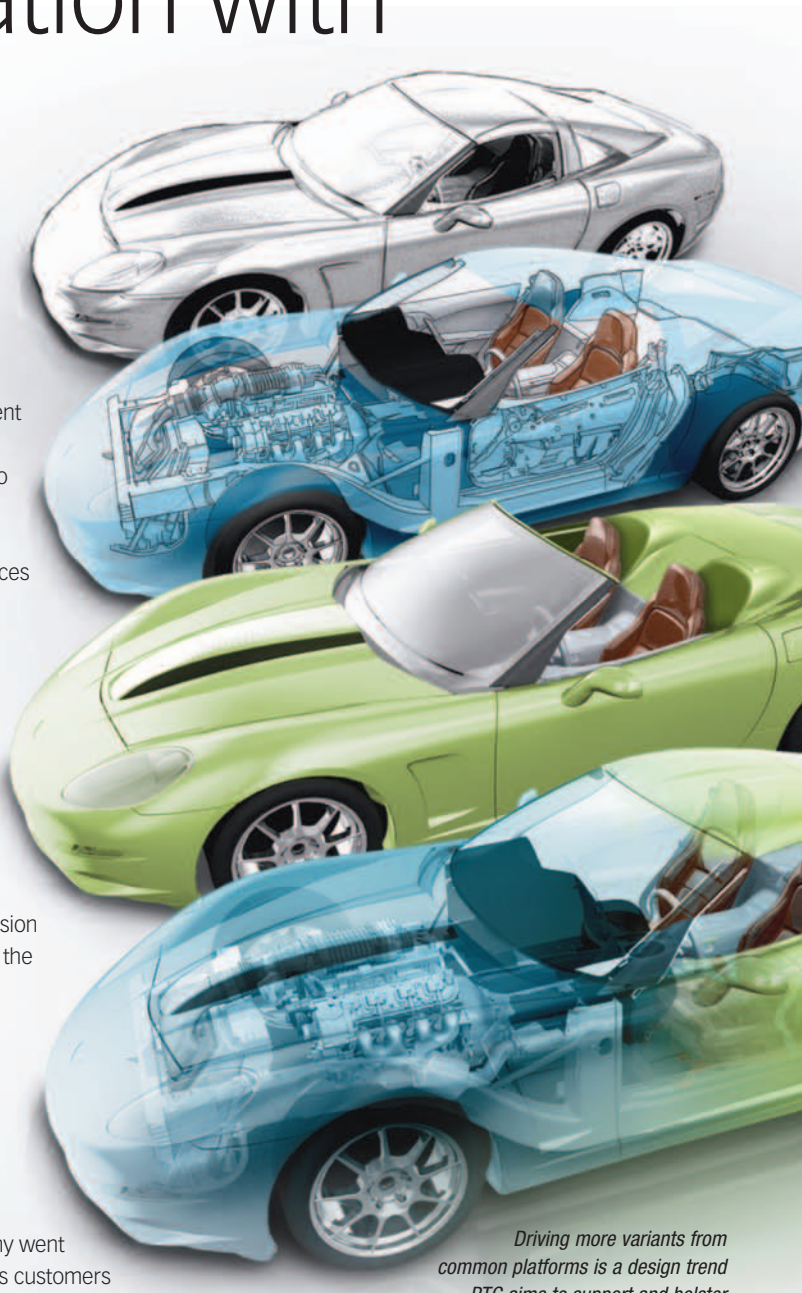
Balancing innovation with standardisation

PLM is helping companies respond to the growing competitive pressure of getting more products to market quicker. Justin Cunningham finds out how.



Driving more variants from common platforms is a design trend PTC aims to support and bolster

For some engineers, the value of PLM can be difficult to grasp. It can be viewed as somewhat bureaucratic, creating procedures that are more about measuring performance, managing change, and handling production than innovation, design and actually adding value. It is criticised for stifling creativity and taking up time that would be better spent elsewhere. But here is the rub: PLM is not all about engineers.

Ultimately, it is about getting better products to market more quickly and efficiently. Like much of the western world, the UK has come under intense commercial pressure in recent years as emerging economies continue to compete with a vengeance. Western companies need to be more efficient and they need to be smarter. And that means leveraging and exploiting technology and systems like PLM.

The CAD and PLM giants are now producing extremely powerful software that can be integrated throughout enterprises to capture data and use it to improve design. So what does this actually mean in practical terms? Potentially, it means that the knowledge of a manager at a department or sites can be shared much more easily; that expertise and ideas from engineers can be captured; and that information traditionally exchanged around the coffee machine or across desks can be digitised and made globally available.

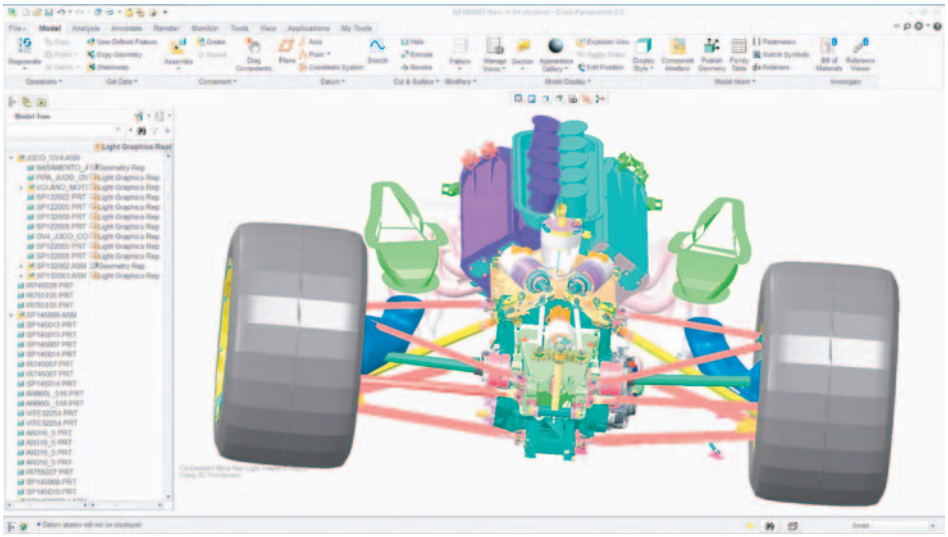
As romantic as all this might sound, PLM is actually at the stage where this seemingly peripheral data can increasingly be leveraged as an asset. If a service engineer in a remote region has an idea to improve the design to make maintenance easier, it is not lost. Strategic business and engineering recommendations are not lost in the pages of an annual report. Everyone, for example, who needs to access what a design department across the other side of the world is up to can do so quickly and easily. It also means local preferences and influences are replaced with more standardised parts and platforms.

The best strategic decisions come from those that know what is happening on the ground. And PLM is about unlocking what line managers and engineers know, so decision makers can understand the issues, hear the recommendations and make good strategic decisions for the business, and react more quickly.

At the recent Planet PTC Live world user conference, the company went to great lengths to get its customers to exploit the capability of its software more fully.

What is all about engineers is design software and it is clear that PTC is placing high hopes on the recent release of its CAD package, Creo 2.0, to overcome many of the previous issues with Pro/Engineer. It is more intuitive and easier to use and incorporates different approaches from 2D sketching to direct modelling to parametric modelling, to accommodate the different types and stages of the design process. PTC says Creo 2.0 is in a much better position to support the trending design and business philosophy of engineering more variants from fewer platforms.

"Almost half of our customers say this is a key strategy going forward. It is a business priority to reuse common platforms and modules," says Mike Campbell, division general manager of CAD, at PTC. "If you are going to meet today's demanding challenges around time to market, you have got to be able to quickly reuse and repurpose existing 3D geometry."



In response to this, PTC has introduced the Creo Options Modeller. This application is specifically built for designers and engineers who need to validate and reuse 3D digital definitions of configurable products early in the design process.

At present, many designers use a workaround in Pro/Engineer or another CAD system by building up a single 'super assembly' – often called an 'overloaded assembly'. This uses every possible component and configuration a particular product could ever have, which the designer copies and simplifies to make a variant.

Creo Options Modeller instead uses a modular assembly made up of interchangeable components that are mapped to one another. This avoids the time-consuming overloaded approach and can automatically create variants by selecting options that drive included or excluded components within a design. Designers can, however, manually override any of these options and create any combination of parts they see fit.

Speaking at the conference was appliance manufacturer Whirlpool. The company last year celebrated its 100th anniversary and is currently further implementing PLM across its organisation. It has recently released it Maytag Maxima washer and dryer which took two and half years to develop. And that, says the company, is simply not good enough.

"If we can't speed up our time to market, we don't need to be talking about our 200th anniversary, put it that way," says Jeff Burke, a director of the program management office at Whirlpool. "We want more product variants but with fewer product platforms, to be able to give our brands more differentiation to satisfy the needs of local markets, but with more standardisation so that everything else inside the product doesn't have to change."

Companies such as Whirlpool (below) believe PLM can help them achieve a much shorter product development cycle

PLM can help drive standardisation. This in turn has benefits when it comes to time to market. If parts are standardised, the supply chain is already in place, there is no need to go through a procurement process, and economies of scale help bring costs down.

"We have been able to drive some huge improvements by creating databases of parts, by organising parts and making that information available," says Burke. "It is not that engineers haven't wanted to do this before, it's just they might not have been familiar with a part or have known where to find it, so that makes it difficult.

"We have been able to reuse parts like valves, motors and engines across brands and product types. Once we have global availability of that information we can standardise it across the enterprise. Fasteners, for example, we have been working on for a long time and that is a pretty standard component. We have a good global database, so engineers in Germany or the US can't just create a fastener – they're not allowed to. They have to go to the library and if the one they need is not there, they have to request that one be created."

Requesting permission to use a fastener might seem bureaucratic to the engineer, but PLM is about standardisation and defining the boundaries for which designs can, and should, be produced. As Whirlpool continues to follow its roadmap of PLM integration, it is finding the benefits, in terms of getting more products from fewer platforms to market faster at a lower cost and at better quality. But can over-standardisation inhibit innovation as engineers feel too constrained to try anything new?

"People might have this view of PLM as a constraining force," says Fred Bellio, a chief information officer at Whirlpool. "But, there is value in a little bit of constraint, and I like to think of that as collaboration."

Bellio is an engineer and understands these qualms more than most. He says: "We do get feedback about a fear of over-bureaucracy; it is one of our biggest fears. If you look at failure modes and poor PLM implementations: if we don't do this right we are going to do exactly that, we will put too much bureaucracy on our engineers and it will fail."

While designing variants might be a fairly constrained process, Whirlpool says it wants to give more freedom to its engineers at the concept level. As long as it can get feedback in to the design loop much more quickly, it is actively encouraging its engineers to try new things.

Bellio concludes: "We can say very quickly as a company 'let's fund this idea as we think there is value in it'. We can get more ideas, focus on the right ones, put them in to the product development process, and ultimately take more variant products to market more quickly."

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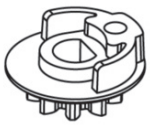

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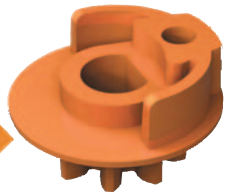

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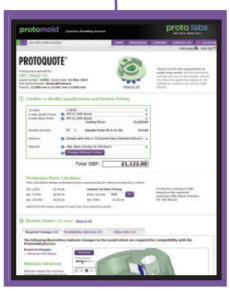

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3D printing nears the mainstream

Is 3D printing any nearer becoming a truly ubiquitous, affordable, desktop technology? Paul Fanning reports on some recent developments that suggest it is.

Almost since its inception as a technology, we have been promised that additive manufacturing will become a mainstream industrial technology. Thus far, this has not proved to be the case, but a number of new technologies have appeared that seem to be moving 3D printing into much more accessible areas.

Now in its 20th year, the US-based RAPID show has become the place for the latest additive manufacturing, 3D printing and rapid prototyping technologies to be announced. In this respect, RAPID 2012 in Atlanta was no exception, with leading names in the market having shown their latest machines.

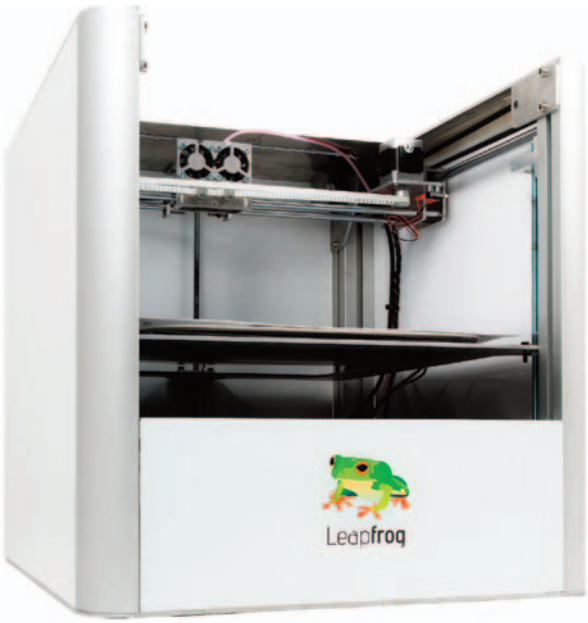
One was Mcor Technologies, which announced the Mcor Iris full 3D colour printer. The Iris joins Mcor's family of paper 3D printers and continues the vision of producing high-quality, low cost and eco-friendly 3D printing solutions.

This technology offers a full-colour 3D printer using regular letter paper. The Iris, it is claimed, prints photo-realistic 3D parts with the resolution you would expect from a high quality 2D colour printer.

Objet was another launching a new machine, offering the Objet30 Pro desktop 3D printer. As its billing suggests, the machine offers a small, genuinely desktop, footprint (many other 'desktop' printers would require a desk of mammoth proportions to hold them), a build tray size of 300mm x 200mm x 150mm and quiet operation, it represents a further step towards making 3D printing a realistic, office-based technology.

Existing as the top-of-the-line model in Objet's desktop stable, the Objet30 Pro is clearly targeted at designers and engineers in industries from consumer goods and consumer electronics to medical devices and design consultancies. Designed to offer the accuracy and versatility of a high-end rapid prototyping machine in a small footprint, the machine offers 28 micron print quality and seven different materials. These materials include – for the first time on a desktop system – clear transparent material (Objet VeroClear) and high temperature-resistant material. It also includes a polypropylene-like material for simulating snap-fit parts (Objet DurusWhite), as well as four rigid, opaque materials for standard plastic simulation in black, white, grey and blue.

The company with which Objet recently merged, Stratasys, took one step further towards genuinely office-friendly 3D printing with the launch of the Mojo 3D Print Pack, which it showed at RAPID 2012. At just £6,400 ($9,900), it represents a huge step forward in terms of affordability when one considers that the Objet desktop range begins at $19,900.

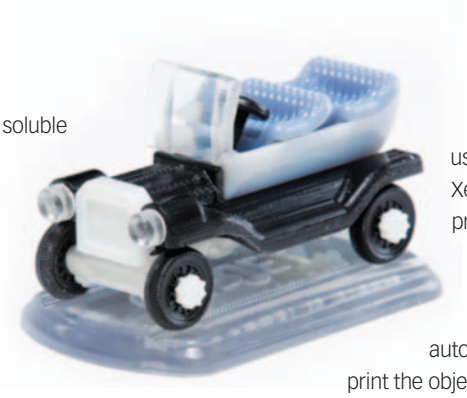


The Mojo is designed to be as simple to use as an inkjet printer, while being powerful enough to meet the highest 3D printing standards. Rather than being a network printer, it connects to a host computer via USB and files can be processed on other computers using Stratasys' Print Wizard software, and then sent to the Mojo-connected computer for printing.

Mojo also takes its lead from inkjet printers in its use of what Stratasys calls a 'QuickPack Print Engine'. In this, the print engine and material are all in one package and the user simply drops the model material and support material packs in and snaps in the print heads as they would on an inkjet printer.

Emphasising the fact that it is very much a professional machine, however, Mojo produces models in ABS production-grade thermoplastic and is powered by the same FDM (Fused Deposition Modelling) technology that is used in Stratasys' uPrint and Dimension 3D printers, as well as its Fortus 3D production systems. That said, it only prints in one colour and its build tray is just 5 x 5 x 5 inches, although the company claims 80% of 3D printed models fall within this envelope.

As well as software and start-up materials, the Mojo 3D Print Pack also includes the WaveWash 55 Support Cleaning



System, which is designed for soluble support material removal.

Even more affordable than the Mojo, however, are the products available from recently-launched Dutch company Leapfrog. Its Creatr and Xeed printers (500 x 600 x 500 mm and 800 x 600 x 500mm) sell for $1570 and $6178 respectively and, while they are some distance from being desktop machines, they do offer an interesting entry-level option when it comes to 3D printing.

The Creatr is the cheaper, 'consumer' model designated for "personal and semi-professional" use by the company. It is designed to be an easy-to-use, fully-assembled, 'plug and play' machine that operates via a USB port and a 220V power plug. The linear slides and sliding ball bearings are pre-tensioned to make sure the construction is rigid and, most importantly, that there is no difference in theoretical and actual positioning accuracy.

For professional users, however, the Xeed is a stand-alone printer offering a tablet interface to which users can email their models and it will automatically convert and print the object. There is also no need to install software or hook up a computer, and with the quick-load drawer system, cartridge changes are simple and easy. The material that can be used is 1.75mm ABS, PLA or PVA. Incorporating the FDM 3D printing technique, the Xeed is available with dual extrusion heads, which, when used with water-soluble plastic allow the user to print overhanging items.

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Composites hit new heights

Building the biggest clock face ever conceived, on the second tallest building in the world has its fair share of problems. Justin Cunningham finds out how composites came to the rescue.

To scale: A man stands at the base of the crescent at the top of Makkah Tower

There has been an awful lot of overlap of materials knowledge in the last few years between industries, particularly when it comes to composites. This is because these are the materials that everyone is still trying to fully exploit fully and engineers from all industries are coming together to share knowledge in an effort to make that happen.

For example, the aerospace industry is experienced in making strong, light, reliable parts and structures, while the automotive industry has the knowhow with regard to automation and speed of manufacture.

The two are learning from one another, as are other industries that are coming in to the frame such as marine and renewable energy. So, when faced with building the biggest clock face in the world – on the second tallest building in the world – it should come as no surprise that engineers turned to composites to make it happen.

Standing 607m tall, the Makkah tower is an impressive structure featuring illuminated clock towers that can be seen for miles around the city of Mecca in western Saudi Arabia. A particularly distinctive feature is that the tower uses fibre reinforced plastic (FRP) sandwich panels to clad the top 200m.

Composite material manufacturer Gurit worked closely with the tower top designers SL-Rasch on the project and turned to the material essentially for the same reasons that those in other industries have: to reduce weight while maintaining stiffness and strength.

This is fairly unusual for civil engineering projects, since usually foundations are just made stronger at early stages of the build to accommodate more weight.

However, the design of the upper tower, clock face and upper crescent 'evolved', fairly dramatically, after the initial construction of the lower levels was well underway.

"This lead to concerns about the amount of dead load on the building as the foundations had already been built," says Dr Mark Hobbs, a senior engineer of engineered structures at Gurit. "Initially, it was just a simple small spire on the top, but after building started, the clients decided to add the clocks, the dual spire and crescent all on top of it. This meant there was a significant increase in deadweight on the tower top; about 12,000 tonnes of main steel work in the tower top region alone."

By turning to advanced Fibre Reinforced Plastic (FRP) sandwich panels Gurit was able to more than halve the weight. In addition, the intricate 3D shapes in the cladding would not have been possible with more traditional materials.

The changes meant that some 40,000m^2 of

FRP composites were to be used as cladding as well as for the largest clock face in the world (43m), and a minute hand that spans 23m. Gurit supplied a range of advanced composite materials, to Premier Composites Technologies based in Dubai, which carried out fabrication and installation of the cladding, clock face, clock hands and crescent.

The clock hands presented a particular challenge due to their long, slender geometry and the potential for high wind loadings caused by its height. The clock hands were manufactured using Gurit's WE91-2 carbon fibre prepreg material and Corecell T-Foam structural core.

Prepreg is traditionally a material used by the aerospace industry and this particular composite was originally developed by Gurit for use on wind turbine blades as it has an excellent stiffness-to-weight ratio, mechanical properties, toughness and low resin uptake.

The project was typified by its need to be completed quickly. The large, pre-assembled sandwich panels facilitated this desire, with some panels as large as 13m by 2.1m. These were preassembled in to 12m by 13m bays and then lifted in to place in a single go.

"One of the most interesting challenges was the crest on the top of the building," says Dr Hobbs. "The original design saw a main steel structure inside the crest which would have composite panels clad over the top. However, during the development of the design there was a desire to free up the space inside to allow it to be used as a meeting or prayer room."

In order to do this, Gurit changed the structural concept completely by removing all the steel work inside the crescent and replacing it with a monocoque shell structure. The new crest would be 21m in diameter and have some 700m^2 of surface area. If it could be unrolled it would lay 60m long, 5.5m tall, and 7m wide.

Gurit applied techniques usually applied to the marine sector, using a monocoque shell structure with sandwich panels to form the shell, internal ribs and bulkheads – much the same way in which it would design a boat.

"Our experience in the marine industry did prove useful," says Dr Hobbs. "Changing from the steel structure to the composite shell not only opened up the space inside, but also removed 50 tonnes of steel structure and replaced it with about 19 tonnes of monocoque composite."

The team decided to build the crest in 13 separate pieces that could be pre fabricated and transported by road, and then assembled on site. But joining the preassembled pieces also proved a challenge as it was difficult to get the ideal conditions needed on site to make a laminated joint. As a result, the team decided on bolted joints. Although this increased the overall weight, it was a necessary trade-off.

"When we came to look at the detailed design, another concern was the interface between the composite crest structure to the top of the building, and different ways to attach the crescent to the top of the spire on the building," says Dr Hobbs. "One of the first concepts was looking at something akin to the keel structure on a boat, where there is a framework underneath. We would bolt a piece of composite on top of the steel tower frame and attach the rest of the crescent there."

However, this had a couple of disadvantages. It meant that the crescent couldn't use the full depth of the composite and join for transferring the load between hub section and the mid. It also meant there were some separate cladding pieces that needed to go on after it was installed.

"This gave rise to quite a lot of concern about having a smooth joint between the cladding and the hub section," says Dr Hobbs. "So we moved to a solution that was very similar to what we did on the clock hands. This is having a steel hub around which we assembled a composite structure. The composite structure will be assembled round the steelwork in the factory in Dubai. Then we have a steel connection.

"Eventually we extended the steel strut, the main steelwork, back up inside the crescent. This was a much bigger lever arm to react to the loads and also made a good contribution to the stiffness of the crescent. We have two steel collars which were bolted to the composite structure in situ, so when we put them on, we were doing steel connections on site as well, which was a major advantage."

Additionally the stringent fire safety requirements of buildings could easily be satisfied by Gurit as it has experience working with oil and gas customers to ensure blast protection walls, as well as supplying materials for aircraft interiors.

The composite world has a lot to gain from projects like this that use advanced materials in traditional buildings and structures. The transfer of knowledge, particularly when it comes to joining multiple materials together, often in the field and in far from ideal conditions, is something no doubt Gurit will be able to transfer back in to other sectors.

Hobbs concludes: "This project has made full use of Gurit's wide range of expertise in the technology of advanced FRP composite structures, including materials development, processing, testing and structural engineering."

www.gurit.com

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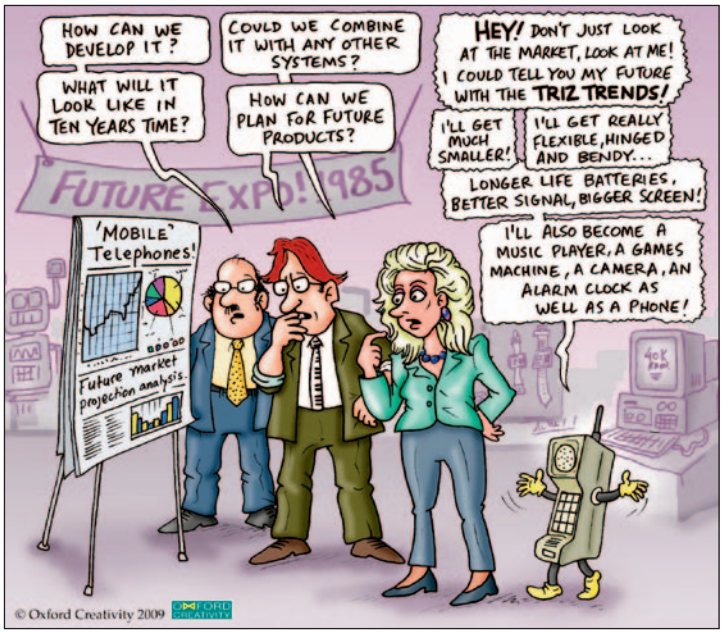

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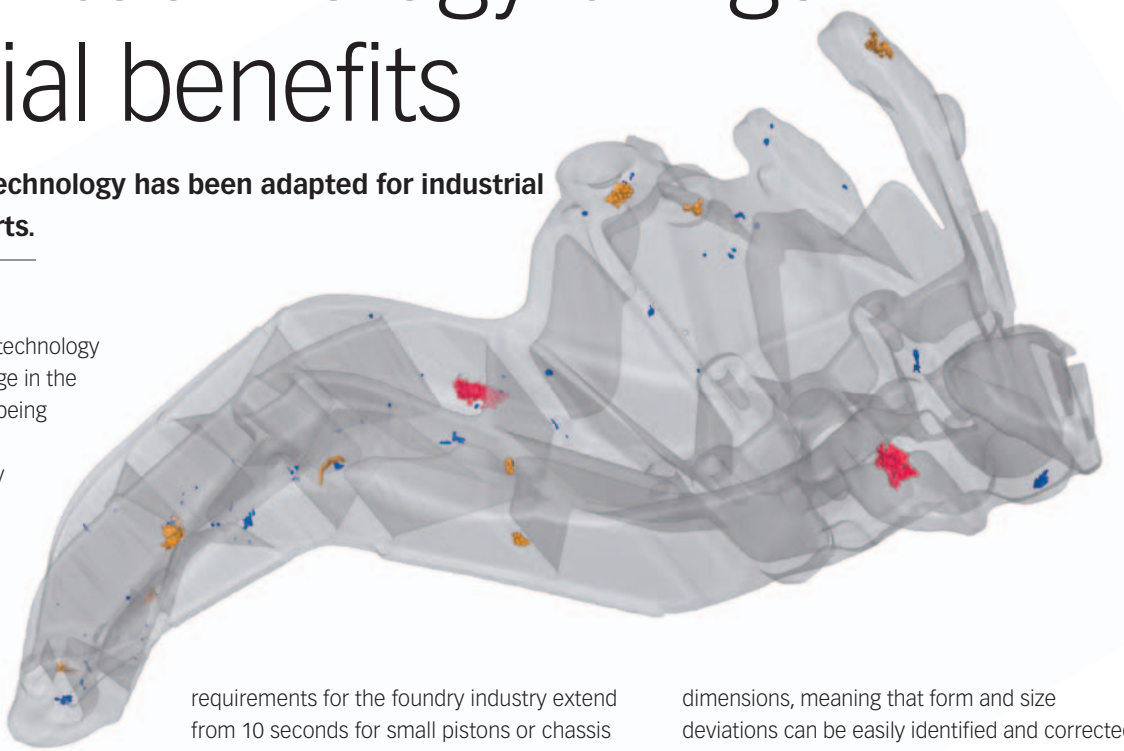
Medical technology brings industrial benefits

A medical inspection technology has been adapted for industrial use. Paul Fanning reports.



A modified medical scanning technology promises to be the next stage in the evolution of X-ray technology – being deployed to bring high-speed 100% 3D Computed Tomography (CT) inspection to the inspection of castings.

Incorporating technology that has been proven in medicine for over 40 years into the industrial arena, the new speed|scan atlineCT system comes from the Inspection Technologies business of GE Measurement & Control. High-speed CT is the only method currently available that allows internal structures of extremely complex components made of cast alloys, (such as wall thicknesses in cylinder heads), to be inspected on a non-destructive basis directly on or near the production line.

The system uses Helix multi-line technology, where a gantry with an X-ray tube and corresponding multi-line X-ray detector rotates around the workpiece, which is being passed through the gantry on a conveyor belt. The workpieces are scanned at speeds of up to several millimetres per second and are automatically assessed with the aid of GE's own speed-optimised 3D Automatic Defect Recognition (ADR) algorithms.

Although used in medicine for many years now, CT inspection has only developed into a reliable method for scientific and industrial inspection over the last few years. This technology makes it possible to carry out one hundred percent 3D inspections for a very wide range of industrial applications, even at high throughput rates. The typical throughput requirements for the foundry industry extend from 10 seconds for small pistons or chassis components to as much as 80-90 seconds for complex engine components, such as cylinder heads. A fully automatic inspection method, including the whole data acquisition and analysis process, is required to meet these cycle times.

In addition to increased speed, there are benefits such as a reduction in reject rate by analysing position and form of defects that may be machined out by subsequent processes to prevent unnecessary failures occuring and by accurately checking workpiece geometry and dimensions, meaning that form and size deviations can be easily identified and corrected at an early stage of the production process. Finally, depending on their size and absorption behaviour, even foreign materials like inclusions or sand core remains may be detected, located and classified according to density and position.

Moreover, to avoid waste, it is possible to check whether identified porous areas will be open on the final surface before processing begins. At the same time, the scanned workpiece geometry can be checked for anomalies using the nominal CAD data.

While the concept for the fast industrial inline CT system is based on medical tomography systems from GE Healthcare, a number of adaptations have had to take place to transfer this technology from one arena to the other. For this reason, the scanners have been given appropriate transport facilities and automated 3D failure evaluation software modules for continuous operation in high-speed industrial inspection systems. In addition, a specially-developed, air-conditioned safety cabinet not only protects the surrounding area from the X-ray radiation, but also protects the tomograph from the dust and heat generated in harsh production environments.

www.ge-mcs.com/speedscan

Driven to **distraction**?

Justin Cunningham finds out how sensor technology is enabling drivers to safely access social media sites and even surf the internet while driving.

Today's drivers have more distractions than ever. It is not unusual to have a satnav blaring out directions, while having a phone conversation (hands-free of course) with the radio and traffic reports on in the background.

Despite all this, being in the driving seat is one of those rare times where we get a break from emails, the internet, and social media. But in-car information and entertainment systems, dubbed infotainment systems, are getting ever more sophisticated and are bringing Web 2.0 functionality to the driver.

At the forefront of this type of technology is Harman, which designs and manufactures audio and infotainment solutions for the automotive, consumer and professional markets. However, one of the main challenges is how to deliver it safely without distracting the driver.

"As we are moving forward in this digital age, we are putting ever more content in to the car," says Hans Roth, director of business development at Harman. "Content coming from Facebook, Twitter, or emails: we need to offer this to drivers, but critically we must provide it in a safe way."

Harman has been developing various man/machine interfaces over the last few years including voice recognition, haptic touchscreens and steering wheel buttons. But it now wants to add gesture recognition to the mix.

By installing infrared and camera sensors in to a car, Harman wants to make it possible for drivers simply to flick their hand or shake their head to change radio station or finish a phone call. Such a system, of course, makes a lot more sense than voice recognition, looking for buttons to push, or using a touchscreen that requires even more accuracy, meaning your eyes need to look at a console or button for longer, when they should be focused on the road.

"In certain cases, simple gestures are much easier than voice recognition or anything else," says Roth. "Swiping your hand over a certain area, which you do not have to look at, to change songs or radio station for example, is faster and easier than if you give a verbal command like 'next radio station'."

However, most drivers use body language fairly regularly to – for instance – wave a person across the road, thank someone for giving way, or to express displeasure at another driver for one reason or another. The last thing the driver wants is for such a gesture to trigger a

Above: Gesture recognition could be a real feature in cars of the future.
Below: The Safe Road Trains for the Environment (SARTRE) project

phonecall to the office or change radio stations.

"We often use the example of the Italians, who, from a cultural point of view, do tend to be very 'active' with their gestures whilst driving," says Roth. "The gestures used therefore need to be so simple that they are not easily misinterpreted. We are being very selective in developing this gesture catalogue. Additionally, the sensors themselves will only 'look' in a certain area."

This area could be in the general vicinity of the main console and the gearstick for example and drivers would not need to be too accurate when waving a hand in front of it. Harman has developed a means of accessing internet content in the car on what it calls 'Aha Radio'. The technology acts like a radio band, i.e. FM, AM, DAB and Aha, and offers access to podcasts, traffic, internet radio and social media sites like Facebook and Twitter.

"The system is able to read out posts of friends, Twitter feeds, emails or local traffic," says Roth. "In terms of functionality, it is like selecting a radio station. This is the way we envisage internet usage while driving."

Whether the system will be smart and quick enough to enable voice dictation to post on Facebook, tweet or reply to emails is still unclear. However, this is more than likely not far away and is something Harman is developing.

However, the increased use of internet and social media while driving could not be a concern at all in the near future, following a project in Spain. The Safe Road Trains for the Environment (SARTRE) allows cars to follow a lead vehicle in convoy.

The project recently demonstrated the technology on public roads with a road train comprising a number of driverless vehicles (a Volvo XC60, a Volvo V60, a Volvo S60 and a truck) following a lead vehicle, which was driven on a public motorway among other road users.

The joint venture, which includes Ricardo UK and Volvo uses wireless communication to allow trailing vehicles to 'mimic' the lead vehicle using Ricardo's autonomous control; accelerating, braking and turning in exactly the same way as the leader. The project aims to allow drivers to switch on the technology, join the convoy and relinquish control of the vehicle to a computer. This will allow the driver to work on a laptop, talk on a mobile phone or use a smartphone or tablet.

Linda Wahlström, project manager for the SARTRE project at Volvo Car Corporation, says: "Sitting in a car just 6m behind another one while travelling at 85km/h and relying totally on the technology may feel a bit scary. But the experiences gained so far indicate that people acclimatise very quickly.

"Everything should function without any infrastructure changes to the roads or expensive additional components in the cars. Apart from the software developed as part of the project, it is really only the wireless network installed between the cars that sets them apart from other cars available in showrooms today."

www.harman.com
www.sartre-project.eu

The fight against **fakes**

The problem of counterfeited bearings is not confined to the Far East, but has major repercussions here in the UK. Justin Cunningham reports on what industry is doing to fight against fakes.

The problem of counterfeiting is not just restricted to low-tech and low value products like DVDs, clothing and consumer electronics. It's rife, and spans all types of components, products, industries, and countries.

In the UK we often feel that industrial counterfeiting of components like bearings and fasteners is something that is happening in China, perhaps Eastern Europe, but not in the finely hones supply chains that exist around Europe. But counterfeiters are getting ever more sophisticated in their own supply chains and distribution networks which are most definitely penetrating the western world.

The US military is the most recent high-profile example of buying fakes. Around 1,800 cases of counterfeited parts were found on everything from helicopters, cargo planes, and fast jet aircraft to night vision goggles, radios and GPS devices. A probe in to the problem found around 70% of the parts originated in China. But with everyone so heavily invested and committed to doing business there, is this avoidable?

Johan Bravert, counterfeit verification and case handling manager at SKF Bearings, says: "The main mass of the 'good looking' counterfeit copies are coming from China. There are companies in China that are more or less spamming out emails that offer free deliveries on a lot of different products at a fairly good price.

"It is not uncommon that these companies in China pretend to be authorised distributors or have some kind of relationship with SKF, and it could be that someone couldn't get hold of the product they needed, they find the price attractive, or they get desperate for it, so they place an order."

Scanning through the editor email inbox here at *Eureka* we identified two such emails within the last two weeks, which although they could be genuine, look a little on the dodgy side. These are common and regular, with some looking much more genuine than others. The big problem is, it is actually very difficult to know what is real and what is fake.

There is also a difference compared with consumer goods in the way that industrial counterfeiters work. In the consumer world, mass produced counterfeit products are pushed out to the marketplace regardless of demand, with no specific orders to fill. However, counterfeiters of bearings are very skilled and respond very quickly to demand. They can produce different brands of bearings, with identical embossed logos and boxes, to the real ones. And despite the perception that smaller bearings are easier to copy, larger bearing counterfeits are increasingly common.

Fakes often look so convincing that it is often not until use that engineers realise they are counterfeit

There are a huge number of independent 'non-authorised' distributors of industrial components around the UK, from bearings to fasteners. These are fully legal but have not been scrutinised by the OEM to check compliance to a criteria of operation like authorised distributors. Unfortunately, this creates a gap that allows counterfeiters to infiltrate the market.

There have been recent cases of UK distributors that have knowingly brought counterfeit bearings from China to distribute around the country. Last year, SKF carried out a raid in Scotland and found a company had brought cheap fake bearings from China to then re-sell at normal prices locally. This is also one of the main differences with industrial counterfeiting vs. commercial: goods are generally around the same price, not dramatically cheaper as you might expect.

"The end customer pays more or less the same price for a counterfeit product as they would a real one," says Bravert. "Any more than about 10% off the price and people start complaining to SKF asking how it's possible that this company can sell them so cheap."

The counterfeiters take old and used bearings, strip them down and remanufacture them. These low-quality bearings are re-labelled with false brand markings and put into imitation packaging that appears identical to the real thing. Very old bearings can be cleaned and polished to such a high standard that it is hard even for experts to tell with the naked eye if they are fake or not. But when it comes to performance, the difference is clear.

Above left: Old bearings being reconditioned; they look the part but can fail in just hours
Above: Suspect emails sent to Eureka selling bearings

And that is the problem with counterfeited bearings: the unpredictability of performance. Buying products from respected brands instils a sense of expectation when it comes to quality. It allows maintenance schedules to be planned and smooth operations to be carried out. Sometimes counterfeit products can fail after just a few hours and in a catastrophic fashion, causing unscheduled maintenance, forced shutdown and potentially causing damage to a machine and operator.

For example, after only 14 hours of continuous operation, a generator onboard a marine vessel began experiencing such extreme vibration that it had to be shut down. As the generator had just undergone repairs, the crew was immediately suspicious. The vessel's maintenance team removed the suspect bearing and sent it to SKF for bearing failure analysis which concluded that the bearing was indeed counterfeit.

Similarly, for one unfortunate petrochemical processor, it took an emergency shutdown to reveal that it was being supplied with counterfeit SKF bearings. Following just two days of operation, one of its bearings failed in a crucial application, forcing a costly unplanned shutdown.

"As long as there are genuine buyers, there will be counterfeit suppliers," says Bravert. "If an area is very focused on shipping, for instance, then that sector is usually more affected. In other areas it could be automotive parts, while in Scotland the company was very focused on oil platforms and offshore activities.

"In Dubai and Saudi Arabia we have a big problem with the grease we use to lubricate the bearings. That is the only region in the world where we actually see counterfeit grease. This is because they drive transport trucks through the desert so need to lubricate bearings much more frequently. This leads to a higher demand of grease and drives its counterfeit production."

The message from SKF is representative of the bearings industry in general. This is a problem that exists throughout the world, including the UK, and is not confined to those operating, or buying from the Far East. In general, though, the bearings community is working extremely hard to raise awareness of this problem among its customers.

"We still have a lot of cases where we do see counterfeiting, but we do feel it is moving in the right direction," says Bravert. "More customers are aware of the problem and know the best way to avoid a counterfeit product is to buy from an authorised distributors."

Like many bearing manufacturers, SKF has rigorous criteria which distributors need to follow to become authorised. Though the majority of non-authorised distributors operate and offer the 'real-deal', SKF like other bearings companies, cannot guarantee customers are getting exactly what they are paying for.

www.skf.com

Avoiding fake bearings

Unfortunately, there are no hard and fast rules on how to spot a fake bearing. A quick scan of bearing manufacturers' websites suggests they are loath to suggest any definite answers, preferring to recommend that end users only buy via authorised distributors.

Obviously, vigilance and common sense are the consumer's best friends in this context. Thus, if the price of bearings seems too good to be true, it probably is. There are many telltale signs of poor counterfeits – including surface finish, the size of the chamfer and radius, roundness of the bearing or even the wrong markings. However, some fake bearings are extremely convincing. The best advice if there is any doubt at all is to contact the purported manufacturer of the bearing(s) to check.

The World Bearing Association represents the interests of the world's major bearing manufacturers and offers advice about how best to identify and fight counterfeiting in your area. For more information click on the website below.

www.stopfakebearings.com

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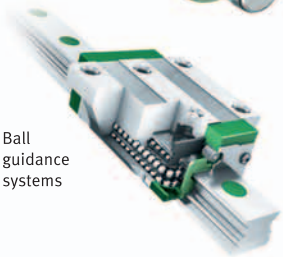

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Better seals for hydraulic industry

Effective sealing is essential for hydraulic applications. Justin Cunningham investigates movements in the industry to improve performance.

The key to efficiency with any hydraulic or pneumatic application is the ability to seal joints between pipes and equipment efficiently. And since ongoing improvement in performance is a driving force for the industry, it comes as little surprise that many innovations are appearing to achieve this end.

US pump manufacturer Wanner Engineering is doing away with conventional gasket technology altogether and has developed 'seal-less' technology for use with its pumps. The technology is now maturing and its most recent 'T' Series of 'seal-less' high-pressure diaphragm pumps enable seal-less technology on higher flow rate and pressure capacity applications.

Its T-Series pumps offer a simple, compact, and low-energy operation platform. The drive components are submerged in lubricant, resulting in minimal frictional energy losses in the internal mechanism with sustained pumping efficiency of above 90% possible.

The company has been exploring seal-less pump operations for some time to offer an alternative to piston and centrifugal pumps that are dependent on control systems to help reduce energy usage. Seals are commonly blamed for the cause of premature wear, which in turn results in a fall-off of performance and increase in energy use.

The T-Series was originally conceived to handle the demanding pumping needs of the oil and gas industry, which require high levels of performance with mixed types of liquids in harsh working environments and remote locations, making reliability, safety, energy efficiency and minimal downtime essential.

The company believes that the development will allow it to compete directly with the popular triplex piston plunger pump systems (a common three-piston/plunger configuration) for applications up to 170 litres/min and 310bar.

In addition, the seal-less technology has been integrated in to a triplex configuration in the T8045, which Warner is claiming to be a world first. This configuration is able to deliver liquid flows up to 170l/min at 207bar and was launched earlier this month at Germany's Achema 2012 in Frankfurt.

However, while Wanner is doing away with the humble seal, others are trying to improve it. An example comes from Garlock Sealing Technologies which has introduced a gasket material that is capable of withstanding up to 1000°C.

Its THERMa-PUR gasket is already being successfully used to seal connectors in biomass gasification plants, marine and land based exhaust systems, and mineral and fertiliser processing plants, which require high performance at extreme temperatures.

The gasket uses a combination of raw materials and a patent pending fibre core. The material is hydrophobic, making it safe to hydro test a system to full pressure and temperature, it also does not stick to flanges, making its release quick and easy.

Under test in the lab it showed good performance and efficient sealing when thermally cycled in temperatures up to 1,000°C. Additionally, because of its non-oxidising formulation and fibre core, it can reduce weight.

Another company, Flexitalklic, is currently celebrating its 100th anniversary and has developed its 'Change' gasket. This, it claims delivers a more dynamic seal, with superior compression and recovery over other gaskets on the market, based on thermal cycling and leakage tests. Flexitallic manufactures static sealing products for the oil and gas, energy and power generation industries.

Initially developed for heat exchangers, Change can be supplied with Thermiculite, PTFE, graphite filler and a wide variety of other metals, making it suitable for an extensive range of applications.

Russ Currie, applications engineering manager, Flexitallic says: "We developed a unique sealing construction and new welding process to engineer 'Change', which was created in direct response to customers' long-term problems with gaskets in poorly performing heat exchangers."

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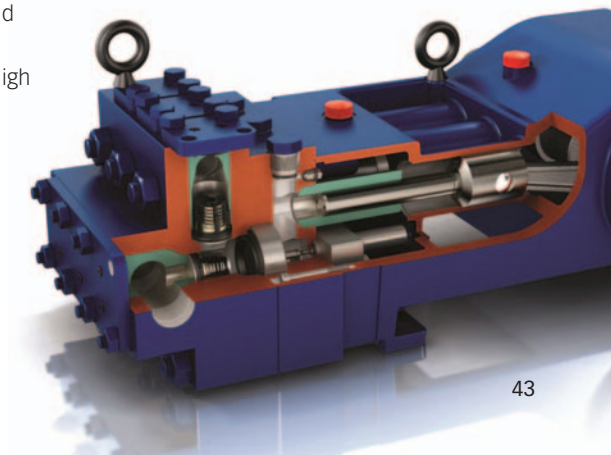
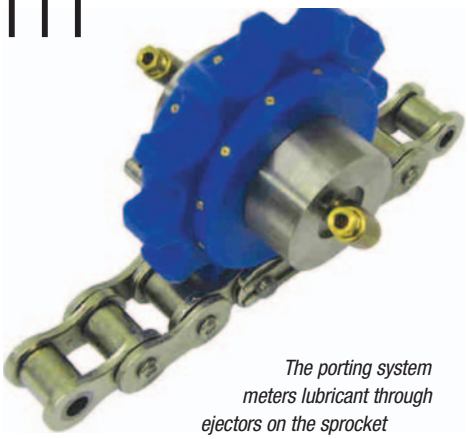


Novel lubrication system extends chain life

A British invention is taking the human error out of chain lubrication and saving money. Paul Fanning reports.

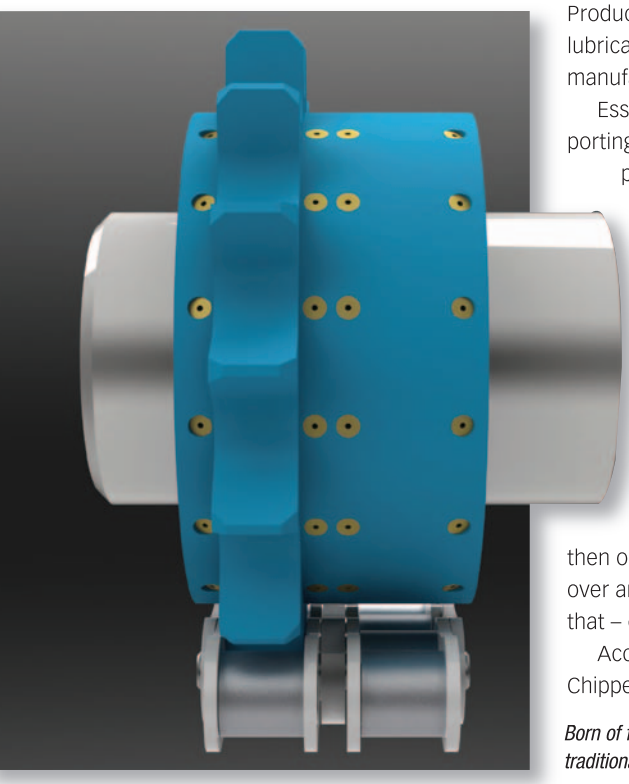


The porting system meters lubricant through ejectors on the sprocket

Effective lubrication is the key to the maintenance and longevity of transmission chains, but, like any process that relies on human diligence, is inevitably subject to human error.

The consequences of not properly applying lubrication can be expensive. Inadequately lubricated chains wear down with alarming speed and lead to costly downtime and replacement. Over-lubrication can be almost as big a problem, as it can encourage the chain rollers to slide, causing flat spots, meaning the rollers will not roll properly and evenly.

Of course, lubrication-free chains are available to counter these problems, but these are both significantly more expensive than their conventional counterparts and are by no means suitable or desirable in all applications.



Born of frustration: The Rotalube overcomes the issues of traditional lubricant application

The conventional methods of lubricating chains – drip feed, manual application, brush application and spit/spray systems have varying degrees of success and can struggle to hit the right spot, especially when chain speeds fluctuate. It was with this in mind that the idea for the Rotalube Chain Lubrication system was developed.

The Rotalube is essentially a controlled applicator that does not suffer from excessive wear, and maintains accurate lubrication whatever the condition of chain. Its inventor, Dave Chippendale of Blackburn-based BKC Products, took the idea to leading UK lubrication specialist Interlube, which is now manufacturing, distributing and selling it.

Essentially, the idea revolves around a porting system that meters lubricant through precision ejectors incorporated within the sprocket assembly.

Although simple in principle, the process is relatively complex, as the interaction from the chain rotates the sprocket applicator and when the ports align within the sprocket body, the pressure within the system overcomes the back pressure of the ejector nozzles. This results in lubricant delivered onto the link plates of the chain precisely and reliably. From then on the science of capillary action takes over and results in a perfectly lubricated chain that – crucially – extends chain life.

According to Keith Horner of Interlube, Chippendale developed the system out of sheer frustration with existing methods. He says: "His basic idea was to come up with a better method than manual, drip, spray or brush. Most of those are fundamentally flawed. Manual methods are subject to human error, brushes deteriorate and drip or spray methods are often erratic as they rely on the nozzles being properly positioned and maintained to ensure that lubrication fluid isn't just being fired into thin air."

Chippendale and Interlube have been working on the Rotalube concept for the last two years. Interlube has developed a new, low-cost ACR pump specifically to operate with standard Rotalube applicators. The 24V DC ACR pump has fully-adjustable run and dwell settings and is pre-programmed to open and shut a solenoid valve that will allow air to mix with the metered oil output from the pump.

The system can be used throughout the food, automobile, steel, fibreglass and cement industries. Typical applications that can benefit include food processing machines, industrial dryers, tissue converting factories, waste paper conveyors, truck manufacturing plants, escalators and elevators.

According to Horner, interest is already considerable from several quarters. He says: "Because it's so different to the standard methods of lubrication, it's attracting a great deal of interest. We've got about a dozen systems installed and working now – some in fairly large-scale, high-profile companies. Judging from the savings they're making, we're very optimistic."

www.interlubesystems.co.uk
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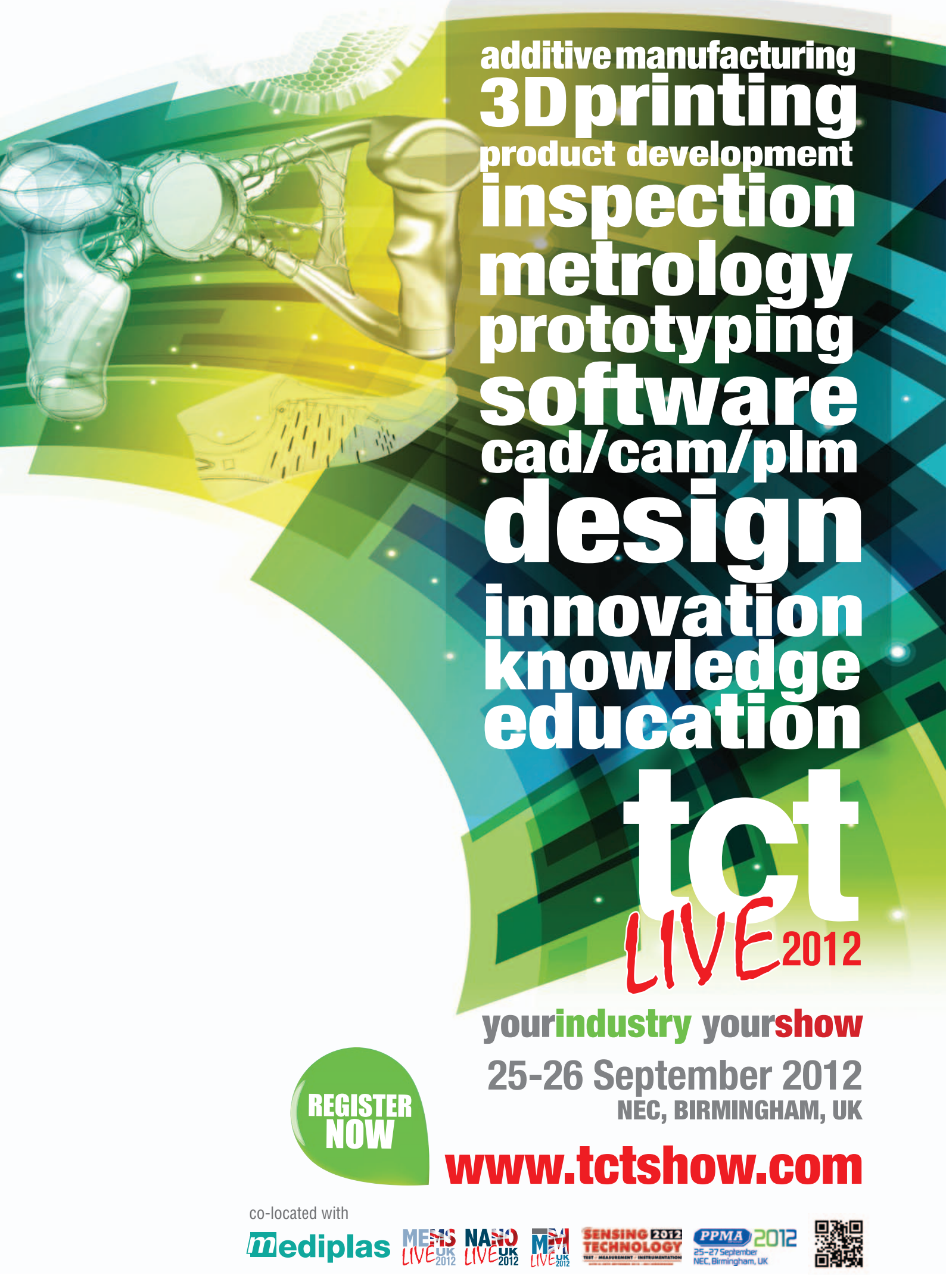
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Eureka has partnered with leading intellectual property law firm D Young & Co LLP to offer advice and information to help companies understand, use and protect their IP. Specialising in patents, trade marks, designs and related intellectual property rights, D Young & Co works with companies ranging from start-ups to established multi-nationals. In this issue, we look at using patents to protect computer inventions, with the help of David Keston, a UK Chartered and European Patent Attorney.

Patents: Computer-implemented inventions

This is the second of of two articles looking at certain aspects of the protection afforded to computer programs by copyright and patents.

There are a number of hurdles facing the inventor who has decided to seek patent protection for an innovation. If a computer processor is required to execute some or all of the innovation, the patent law applied by the European Patent Office (EPO) and national offices in Europe (including the IPO in the UK) set up an extra hurdle – certain classes of invention are excluded from patent protection. It will then be necessary to demonstrate that the invention is new, inventive and capable of industrial applicability.

Our inventor's challenge is to demonstrate that the innovation embodies not only an invention but that this invention is even eligible for patent protection. The law requires that the invention is not merely a program for a computer. Methods for doing business are also excluded. It helps to realise that patent exclusions are relatively narrow – the law only allows an invention to be excluded if they relate to "a program for a computer … as such" (you can read the relevant law at bit.ly/Mw3mF3).

A few years ago there was considerable debate about an EU Directive intended to clarify and harmonise the national laws in this area. The debate became characterised as a suggestion that the exclusions discussed above might be deleted – effectively making all software patentable. In the end, the Directive was rejected by the European Parliament. Our legacy may not be perfect but at least it is familiar. At the EPO we are advised that computer implemented inventions can be patented if:

- They have technical character and solve a technical problem.
- They are new.
- They involve an inventive technical contribution over prior art.

The UK Patent Office takes a slightly different approach, stemming from patent litigation in the Court of Appeal. The idea here is first to make sure the patent claim is properly construed (so that it can be agreed what the claimed invention actually does). The claim is then compared to prior art (any relevant information that was available to the public on or before the day the patent application was filed) to identify the actual contribution. Note that the "contribution" here could be non-technical, technical or a mixture of the two. We then consider whether that contribution falls "solely within the excluded subject matter": this is to check that the invention is not a computer program (or a business method) as such. As a final step, we check whether the actual or alleged contribution is actually (at least in part) technical in nature. That technical contribution gives the invention a chance of patent protection.

In practice, innovations that are implemented by means of software or unique algorithms are not excluded provided there is a technical contribution. Actual lines of code (the expression of the idea – source code) remain unpatentable – but copyright protection is available for code. Likewise for business methods, implementation by means of an apparatus or technical process

may skirt the exclusion provided, as always, there is that "technical contribution". A new accountancy procedure or method of organising a pension scheme would most likely fall foul of the "technical contribution" test because they are entirely non-technical.

This all begs the question – what does 'technical' mean? To paraphrase a sizeable body of case law, there are two half-answers: "you know it when you see it" and "not non-technical". Essentially, we rely on examples and counterexamples to define what is and what is not technical. The application of a scientific discovery may give rise to a demonstrable impact in the physical world and might in turn be taken as an indication of a technical contribution. The scientific discovery itself however is unlikely to be considered to make a technical contribution.

There are other things to look out for. Patent Examiners often point out that a method or process claimed in a patent application amounts to a "mere automation" of a task that is well known. It is generally not enough to have a computing device automate a known task: the technical contribution has to be over and above the typical behaviour of general purpose computers – and they in turn are assumed to be suited to the automation of many repetitive tasks.

So what can our inventor do to improve his chances?

- Provide the patent specification with plenty of material supporting the "technical contribution" beyond the expected behaviour of a general purpose computer
- Point to the impact of the invention on the "physical world" and the technical advantages of implementing the invention
- Always explain how the invention is implemented

Observing the requirements of technical contribution, (and of course novelty and inventiveness) will not guarantee that the inventor will reach the finish line with a granted patent to his name – but at least he won't fall at the first obstacle.

Note:

Examples where invention is not "excluded" from patentability:

1. Processing an image more efficiently so that the image is rendered faster provides a contribution in the field of image processing, which is considered to be technical .

2. Improving control of a robot arm so that components of an ASIC can be assembled and tested in situ would also be considered technical, regardless of the fact that all the controlling commands were represented as lines of computer code.

More information is available at D Young & Co's Knowledgebank at www.dyoung.com. Alternatively please contact David Keston at DAK@dyoung.co.uk or Ian Harris at IRH@dyoung.co.uk

D YOUNG & CO INTELLECTUAL PROPERTY

Stripping yarns!

Removing the outer jacket of an electrical cable to access the core wires can be hazardous. How can it be made safe?

It's a problem familiar to anyone who has ever had to change a plug or connect a light fitting: you need to strip a cable to expose individual wires, but don't want to risk damaging the wires themselves.

The problem, of course, is that, in order to strip the insulating cable, it is necessary to use a sharp blade, something that – unless the user is extremely careful – represents a threat to the wires and the user.

Of course, specific cable-stripping tools are available, but these are not cheap and may not always be to hand in a hurry.

Of course, this is not necessarily a critical issue in the case of changing a plug, but it takes on a much greater significance when one considers the potential implications of damaging the wires in an industrial cable. The damage and losses that could be caused by the interruption of power or communications as a result of such an apparently minor incident does not bear thinking about for most companies.

The Challenge

The challenge this month, then, is to devise a means of stripping away the insulation from a cable without putting the crucial wires within at risk. This could perhaps take many forms. For instance, zips could be installed in cables that allow them to be peeled like a banana, but then resealed if necessary. However, it's difficult to see how such a solution would be cost-effective.

Equally, a solution could be arrived at whereby a series of fastenings runs up the cable, allowing it to be undone and resealed at will? However, this again would seem to present problems in terms of cost effective insulation and would very probably compromise the successful insulation of the wires.

The solution, then, needs to be simple, quick, safe and cost-effective, allowing easy access to the wires while minimising any risk to the operation of the business or to the person handling the cable.

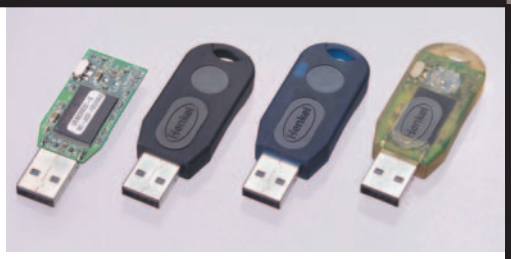
The solution we have in mind is a product that has recently been released by a leading engineering company. It has devised an intelligent solution to strip back long lengths of cable both quickly and easily, simplifying the stripping back of the cables without damaging the cores.

The solution allows electrical engineers and panel fitters to save 50% of the cable stripping time typically required using conventional methods, but also avoid the need for additional cable stripping tools. However, you many have a better idea.

The solution to last month's Coffee Time Challenge of how to move heavy objects is in the Technology briefs section on page 10

Adhesives

Low Pressure Hot Melt Adhesive Moulding



Superior sealing, better protection of electronic/electrical components and higher productivity are the benefits of Henkel's Macromelt moulding. It's a highly cost-effective alternative to epoxy potting and also a low pressure process so breakages are minimised; one PCB manufacturer virtually eliminated a 65% reject rate by switching to this method.

@: technicalservice.loctite@henkel.com
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Adhesive Tapes

Experts in tape engineering

For help and technical advice on our range of double sided, masking, and cloth tapes or converted products please phone:

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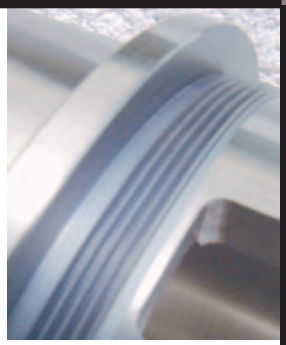
www.tesa.co.uk

Coatings

WS2 Stops galling of SS and Titanium



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

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

Design Out maintenance problems with WS2!

@: sales@ws2.co.uk
✆: 01430 861222

www.ws2.co.uk

Lasers

Laser Marking Ultem®

Synrad CO2 lasers achieve excellent results marking Ultem®

Featuring high tensile strength along with good flame and chemical resistance, Ultem® is commonly specified for aerospace, automotive, medical, and packaging applications for its flame resistance properties combined with low smoke emission. This application demonstrates the feasibility of laser marking products from a Polyether Imide formulation that includes a 10% glass fill for reinforcement. The marking set-up consisted of a 25 W sealed CO2 laser, an FH Series marking head and the WinMark Pro laser marking software. The resultant high-contrast mark was achieved in 0.51 seconds using 25 watts of power at a speed of 10 inches per second. The engraved mark exhibits a high contrast due in part to the 10% glass fill. Synrad lasers are available in the UK through Laser Lines Ltd. Contact: Gary Broadhead.

@: garyb@laserlines.co.uk
✆: +44 (0) 1295 672500

www.laserlines.co.uk

Pumps

Thomas Inside

For over 50 years Thomas (a division of Gardner Denver) has been a world leading manufacturer of component vacuum pumps, compressors and liquid pumps ideally suited to a wide range of markets, including environmental applications such as sampling, monitoring and aeration.

Our technologies include articulated and WOB-L piston, rotary vane, reciprocating and linear diaphragm and peristaltic.

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Pumps

NEW Flojet LF Plus Compact Pumps

Streamlined body - quick clean capability – reliable diaphragm technology

Versatile Flojet LF Plus low-flow industrial motor-driven pumps suit multiple industrial, agricultural, automotive and food processing applications. Proven reciprocating diaphragm technology ensures optimum performance in harsh environments from agricultural misting to chemical wash down for aircraft and automotive uses, plus filtration, cooling, liquid dispensing, food processing, pressure boosting, and automotive diesel fluid transfer applications.

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Sensors

Rugged Position Sensors

Penny+Giles are a UK based global supplier of rugged, precision rotary and linear position sensors to OEMs in a wide range of industrial markets.

Designed for demanding control system applications in off-highway vehicles and other machine controls where accurate, repeatable and reliable output signals are important. We use long life sensing technologies to maximize performance in the harshest of operating conditions.

Developed and qualified in the UK, our product range includes standard configurable designs in rotary, tilt or linear movements, but we also specialize in providing unique custom designs for large scale OEMs.

@: sales@pennyandgiles.com
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www.pennyandgiles.com

Sensors

PCB Piezotronics offers high-temperature microphone

PCB Piezotronics offers a microphone pre-amplifier that can withstand the same temperature environment as the microphone capsule and operate at 120°C. Housed in a ½in package with a BNC connector, the new model HT378B02 is an industry exclusive microphone and preamplifier that operates from ICP® sensor power over a wide frequency range – 5Hz to 10kHz (±1dB), 3.15Hz to 20kHz (±2dB). The preamplifier was designed with the microphone in mind and works seamlessly to ensure optimum performance.

@: ukinfo@pcb.com
✆: 01462 429710

www.pcbsensors.co.uk

Aerospace Engineer

Location: Bristol, Somerset
Type: Contract
Salary/Rate: Negotiable

This company is now seeking an experienced Fuel Systems Engineer to join its growing team within a hugely respected company in the aerospace industry. The team is engaged in the design, integration and testing of fuel systems for large commercial aircraft.

Ideally, the candidate will have experience in this field, or in a similar role. You should have worked in a fluid mechanical development environment, have the ability to apply fluid mechanical knowledge to fuel systems and to learn and understand installation and testing issues.

For full details online, enter reference: qkCznYx

Principal Mechanical Systems Engineer

Location: Shirley
Type: Permanent
Salary/Rate: Dependent on experience

This company is seeking a Mechanical Systems Engineer to deliver systems for a number of high profile and challenging global applications with European vehicle manufacturers. You will work alongside the Electrical Systems Engineer and lead the design teams in achieving outstanding results.

Requirements

- Capture customer requirements documents, generate system requirements and flow down to sub-system requirements. Review and agree requirements with customer and sub-system design teams, as necessary
- Lead design teams to ensure timely delivery and effective integration of each sub-system into a complete system that meets system level targets
- 2.1 or better degree in a relevant engineering discipline
- Excellent understanding of mechanical design principles in both 2D and 3D CAD etc.

For full details online, enter reference: qkCzRyw

Design Engineer

Location: Whitstable, Kent
Type: Permanent
Salary/Rate: £25k-£30k per annum

Amphenol, an innovative and leading edge manufacturer of both connectors and Interconnect systems for applications within the Mil-Aero, telecom and industrial markets, is seeking a Design Engineer to work in this exciting, fast paced £35m sales turnover business.

The successful applicant will be responsible for supporting the new product requirements for areas including C4i, Aerospace and ISS. They will design and introduce new products into production in a timely manner, in accordance with current working practices.

Key responsibilities include:

- The production of 3D models, assemblies and production drawings for new products, including designing assembly tooling
- Ensuring the product in development meets the customer and market requirements, both technically and within costing limits.

Engineering design qualification to HNC/HND level or equivalent essential.

For full details online, enter reference: qkCzGbR

Mechanical/Product Design Engineer

Location: Oxfordshire
Type: Permanent
Salary/Rate: £32k-£40k per annum

This company is urgently seeking a Design engineer to join a rapidly growing product development consultancy/manufacturer in need of talented engineers.

The company manufactures all its products on site and has plans to expand the manufacturing facilities in the near future. However, it also works on a consultancy basis on a number of one-off specific designs for highly recognised clients.

Engineers with experience of working on NPI projects within the generic product development sector are sought. Previous experience of working on products where the consumer is the end user would be highly desirable.

This role will involve working on the design and development of a range of injection moulded plastic products and their mechanisms using SolidWorks, taking these products from concept through to manufacture.

For full details online, enter reference: qkCzmYk

Technical Materials Controller

Location: Portsmouth, Hampshire
Type: Permanent
Salary/Rate: By negotiation

BAE Systems is one of the world's leading global defence, security and aerospace companies, working at the cutting edge of technology, creating more than 100 new inventions every year for customers globally.

It is seeking a Technical Materials Controller who will report to the Maritime and Coastguard Agency (MCA) Contract manager.

Main responsibilities include:

- Accountable for pre-tasking checks to ensure the right materials, equipment and tools are assigned to each Coastguard Team Engineer ready for their tasks at UK MCA sites
- Work collaboratively with supply chain and logistics teams to manage the store's inventory on behalf of the MCA, and receive and despatch equipment throughout the UK
- Accountable for taking issues and problems with materials/tools and applying fundamental problem-solving skills to resolve these.

For full details online, enter reference: qkCzmUn

Hi-Tech Engineering Opportunities

TRW

TRW is at the forefront of designing, developing and manufacturing intelligent safety systems for the automotive industry, supplying leading edge technology to major vehicle manufacturers. We are among the most successful tier one automotive suppliers, achieving outstanding financial results in 2011.

We are now looking for highly skilled engineers at a range of levels to play a role in developing vehicle safety systems. Your knowledge and experience will be fully utilised, as our work ranges from high level research through to the application of systems on to production vehicles.

So if you want a career where you can develop your technology skills then we want to hear from you. We are looking for the following people for our Midlands engineering sites:

- Electronics and Software Engineers
- Automotive Engineers
- Mechanical Engineers
- Programme Managers
- Steering Systems Experts
- Test & Validation Engineers

To find out more & to apply, visit us at:
http://engineeringuk.trw.com/

Please quote 'Eureka' in any correspondence.

Lead Mechanical Engineer

Location: Cambridge, Cambridgeshire
Type: Permanent
Salary/Rate: Negotiable

This company is looking for someone to provide a significant contribution to major fast track medical technology development projects. The position will require you to apply your mechanical engineering abilities to the development of world-leading medical products for clients around the globe. You will both lead and work within multi-disciplinary teams of highly talented people to develop novel solutions to complex technical problems.

The Medical Technology Division undertakes the development of innovative medical devices and equipment from concept to prototype manufacture, often incorporating considerable technical challenges. As a Lead Engineer in the Instrumentation Technology Group, you will be involved in the hands-on product development and design of complex electro-mechanical systems. You will contribute to multi-disciplinary projects in teams of engineers, consultants and designers.

For full details online, enter reference: qkCzmIH

Mechanical Design Engineer

Location: Kent
Type: Permanent
Salary/Rate: £30k per annum

A Mechanical Design Engineer is sought to work at a leading company in Kent, where they will be a part of the design process at a deeply technical level, working at component level with moving parts.

Skills required:

- Strong Mechanical Design engineering background
- Experience working with 3D FEA methods
- Previous work with precision casting methods and prototyping would be ideal.

Due to the nature of the client, it would be desirable for candidates to hold, or be eligible to undergo, SC clearance.

For full details online, enter reference: qkCzmJp

cube67+ – THE PLUS FOR ADDED FLEXIBILITY

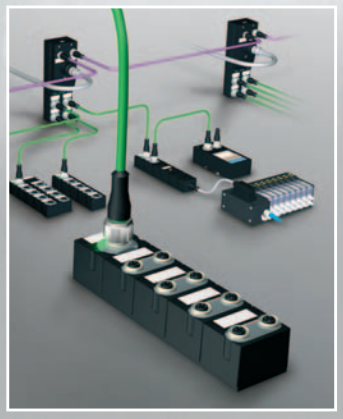
The next generation

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

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

Cube67+ : a truly flexible system.

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



Cube67 – the modular bus system

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