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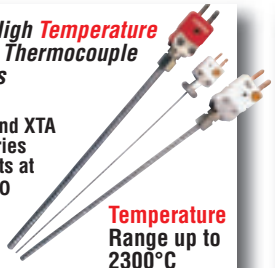

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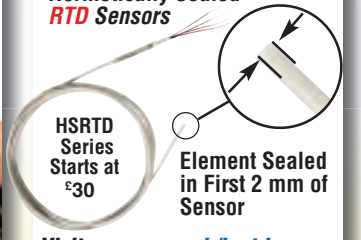

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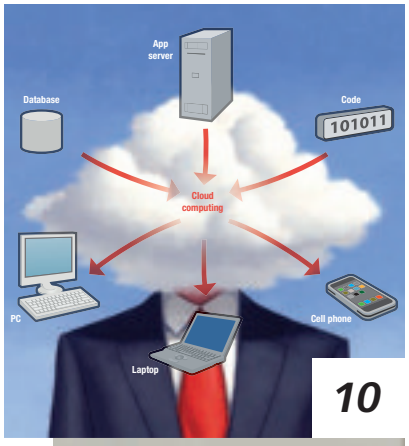

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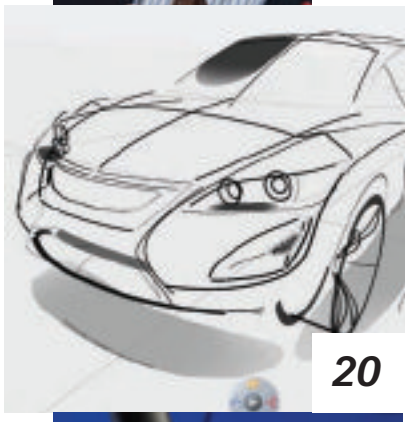

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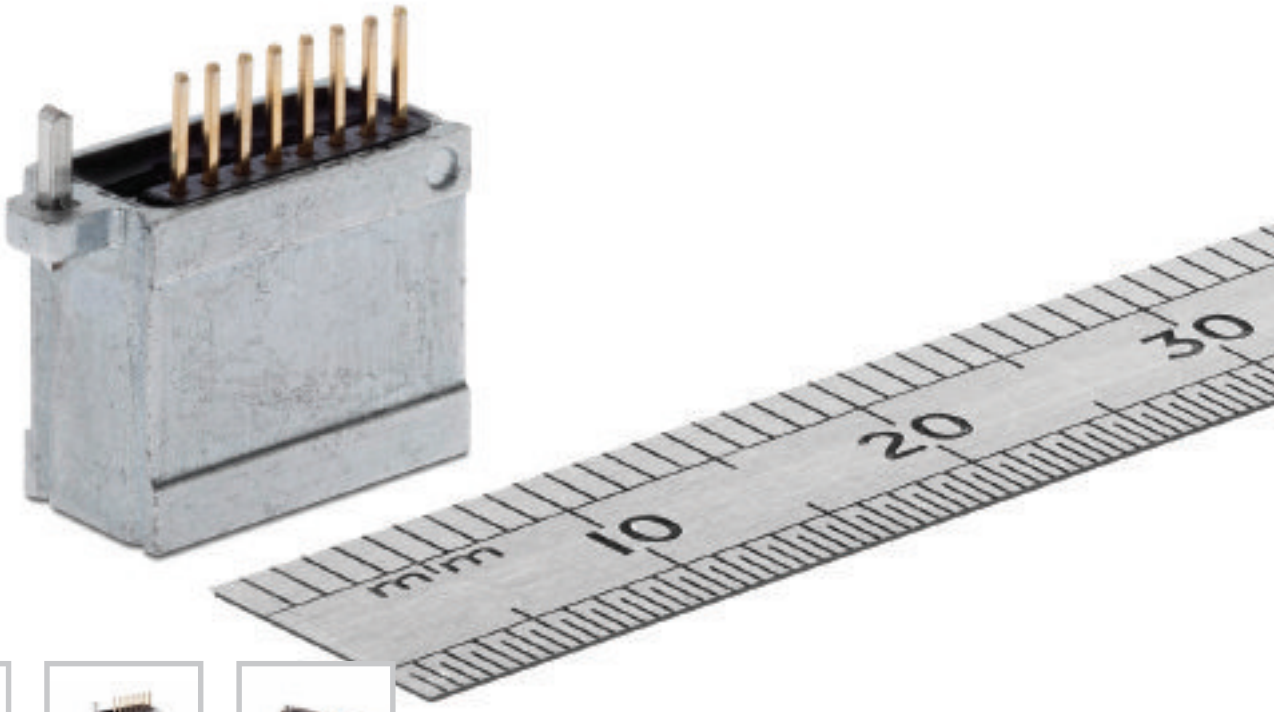
RoLin™ the new miniature magnetic encoder system



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Seeing past the gloom

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

It has become something of a media tradition that the New Year is a time for journalists, pundits and 'experts' make predictions about the year to come.

While venerable, this tradition is of dubious value, since any predictions made are usually long forgotten even if they come true – a fact for which those whose predictions prove somewhat less than accurate are generally very grateful.

This annual offering of hostages to fortune has this year taken on a particular and fairly universal tone. For obvious reasons, the safe bet as far as most pundits are concerned is to predict economic doom. Indeed, if one were to take every headline regarding the economic outlook for 2012 at face value, one would be hard-pressed to find a good reason to get out of bed in the morning.

Nobody, of course, is suggesting that everything in the garden is rosy. Clearly, there are serious problems facing the global and national economies that cannot be ignored or downplayed. By the same token, however, not everything is quite as bleak as the media coverage might cause one to think.

There is nothing inherently wrong with people looking ahead and trying to prepare themselves for all eventualities. However, the problem arises when negative prophecies become self-fulfilling. For instance, there is nothing more likely to damage business confidence than yet another announcement that business confidence is low, but the reports, surveys and market research keep coming.

Ultimately, the only sensible answer is to take every announcement – positive or negative – with a large pinch of salt, a measure of stoicism and a determination to make the best of things.

New sponsors sign up to design event

Measurement and control specialist Heidenhain and design tool company Altium/Premier EDA have agreed to act as headline sponsors of the Engineering Design Show.

The two companies join Schaeffler UK as headline sponsors, while other exhibiting companies include such names as Henkel, Laser Prototypes, Wilde Analysis, Metool and Laser Lines.

The Show, which will take place on October 10th and 11th 2012 at the Jaguar Exhibition Hall at the Ricoh Arena, Coventry, will focus on the needs of design engineers in both the mechanical and electronic fields and will include a comprehensive conference and workshop programme.

Running throughout the two days of the show, the conference will focus on a broad range of themes and topics centred on the requirements and realities of design engineering within the UK.
With more than nine months to go until the event, more than 70% of the floorspace has already been sold, meaning that opportunities to exhibit are going fast. For more details of the event or become an exhibitor, please visit the website or contact Luke Webster at lwebster@findlay.co.uk

Engineering design show
10th -11th October 2012 · Jaguar Exhibition Hall · Ricoh Arena · Coventry

www.engineeringdesignshow.co.uk

Government launches Advisory Consortium

A new national programme which will focus on helping small and medium sized manufacturing businesses to grow has been launched today by Business Minister Mark Prisk and the Manufacturing Advisory Consortium (MAC).

The new Manufacturing Advisory Service (MAS) is expected to generate £1.5billion in economic growth and create up to 23,000 jobs. Available now, it will be delivered by the MAC, which currently comprises Grant Thornton, Pera, WM Manufacturing Consortium and SWMAS. Prisk said: "Manufacturing contributes half of Britain's exports and has much higher productivity than the rest of the economy so it is essential to our plans for growth. That is why we are taking steps to ensure our industrial base is thriving as part of a strong and balanced UK economy.

"The new Manufacturing Advisory Service will play a key role, providing tailored advice to businesses helping them to grow and thrive, with a specific focus on helping SMEs improve competitiveness and unlock their growth potential."

Karl Eddy, head of government infrastructure advisory at Grant Thornton and head of MAS, added: "This type of programme is vital to support Britain's businesses and economy in growth."

Semta urges employers to make training investment their New Year's resolution

Semta, the Sector Skills Council for Science, Engineering and Manufacturing Technologies, is calling on employers to prioritise their training plans for 2012 because support is available to upskill employees and recruit apprentices and graduates.

With new funding from the Commission for Employment and Skills (UKCES), Semta is working with employers to develop sustainable solutions to sector challenges such as the competitiveness of the UK supply chain, barriers to hiring apprentices and increasing the number of SMEs hiring graduates. Semta can also provide a range of cost-effective training interventions covering leadership and management, technical skills and productivity improvement, and, through the free Semta Apprenticeship Service, can manage and fund apprentice training.

The past year has presented continued challenges for businesses with the latest CBI Industrial Trends Survey revealing a continuing weakening of order books. So Semta is urging businesses to consider how training could improve productivity, boost order books and increase profitability.

Philip Whiteman, chief executive of Semta comments: "Businesses in our sector account for over half of the total value of the UK's exports, so the right engineering and technology skills are essential to the UK's economic prosperity. Employers that we work with generally see a 6:1 return on their training investment. That's because we work with businesses to identify their specific skill needs and implement training that will meet these needs – it's about making a clever investment in training."

Philip Whiteman

A VISION IN ORANGE

A new version of the dualis vision sensor has just been released by sensor specialists ifm electronic. When it was first launched the dualis was groundbreaking in its size and capability, especially considering that less capable devices are still offered at twice the price. This latest version, designated O2V, still incorporates the critical illumination and evaluation in one stand-alone unit built into a robust, industrially compatible IP 67 housing for use in the temperature range of -10 to 60°C. The parameter setting is as easy to use as before and the software is still free. The additional features of the new model are less tangible, but none the less useful.

www.ifm.com/uk

CORELESS MOTOR HAS BEST-IN-CLASS TORQUE

Allied Motion's new DynaMax 25 coreless motors feature an innovative, low inertia, copper foil rotor and a rare earth neodymium magnet system for unprecedented power density, best-in-class torque to size ratio, and extremely high acceleration performance. Available in the UK from Mclennan Servo Supplies, the 25mm diameter 12 or 24V DC motor has a starting torque rating of 0.4Nm, nominal torque of 0.035Nm, an acceleration response of just 4ms, and a nominal speed of 7700rpm. The DynaMax 25 is aimed at applications where compact size, rapid start-stop and smooth speed performance are prime requisites: with the optional OE22 high-resolution 2000 ppr encoder, the DynaMax 25 will be a great match for high accuracy and high throughput positioning and robotics such as semiconductor, electronic or medical equipment fabrication, whilst encoderless versions will suit high dynamic use.

www.mclennan.co.uk

Small and powerful digital servo drives available

Inmoco has introduced the super-compact SimplIQ DC Whistle, one of the world's smallest panel mounted digital servo drives, from Elmo Motion Control. Weighing just 273g, the ultra-compact, high power density DC Whistle can deliver 20A (3.3 kW) of peak current for use with DC brushed and brushless motors, and linear motors.

The latest introduction to Inmoco's Elmo line of SimplIQ digital servo drives, the DC Whistle measures just 115mm x 75mm x 25.8mm, yet incorporates all the key features necessary for fast and problem-free integration of motors and drives into machines. The DC Whistle incorporates a digital motion controller that features CANopen networking, a position loop, a velocity loop, a current loop and a very wide range of feedback and I/O options. It also offers OEMs the benefits of simplified set-up and tuning, provided by ELMO's Composer software.

The Whistle is the ideal OEM product; it is small and light enough to be wall mounted, along the back of the unit, (it can also be mounted horizontally on a metal surface) or 'book shelf' mounted, along the side. This mounting flexibility cuts installation costs and simplifies maintenance for end-users of the product.

www.inmoco.co.uk

Solution to last month's Coffee Time Challenge

The solution to December's challenge to come up with an improved way to monitor the heartbeats of patents in hospitals comes from Plessey Semiconductors.

Its Electric Potential Integrated Circuit (EPIC) product line is an ultra high impedance solid state electrocardiograph (ECG) sensor. First, the EPIC sensors are dry contact so that no gels or similar fluids are required to make contact. Second, the sensors can be simply cleaned between uses - unlike conventional ECG sensors that have to be disposed of after every use at a cost of £1.50 a set. Thirdly, only two sensors are required that are held in each hand which is very quick to do unlike the current approach. The resolution available is as good as or better than conventional wet electrodes.

Because of the large coupling capacitance to the body (around 250pF) the EPIC sensor's internal electrometer can be used in differential mode to recover true surface potential ECG signals from the surface of the skin.

The device uses active feedback techniques to both lower the effective input capacitance of the sensing element (Cin) and boost the input resistance (Rin). These techniques are used to realise a sensor with a frequency response suitable for both diagnostic and monitoring ECG applications. The total voltage gain of the system is a function of both the input coupling capacitance (variable) and the internal sensor configuration.

www.plesseysemiconductors.com

Tool-less D-SNAP assembly from FDB

Whether using D-SNAP components for assembly of a complete cabinet or just for the door furniture, the specialists at FDB Panel Fittings are convinced that the SNAP-LINE range of hinges, locks, handles and panel joiners can provide big time savings for enclosure production, enabling hardware to be installed without the use of tools or mounting hardware such as screws or nuts.

By using D-SNAP technology, the hinges, quarter-turn locks and swinghandles that are integrated into a housing component, are wedged into the cutout, providing a secure vibration proof installation. Without screws, there is no concern about loose pieces falling off and damaging sensitive equipment. This design offers an installation that is comparable with the strength of conventional products that require hardware and tools for assembly.

www.fdb.co.uk

Better lead times for turntable bearings

R.A. Rodriguez can now offer its customers improved availability and lead times on the Rodriguez GmbH brand of turntable bearings. This is thanks to a second wave of investment by the Eschweiler-based manufacturer that has resulted in the installation of additional machinery including a Pittler five-axis machining centre.

The acquisition enables bearings with diameters of up to 1600mm to be manufactured to high quality German standard, in-house. It will also allow the company to meet customers' needs for small batches – typically 10-20 units – as well as prototypes. Specials can also be accommodated.

Two basic versions of the Rodriguez turntable bearings are available, the KDL series for light applications where high accuracy is not a primary concern and the KDM series that provides a higher order of performance for greater loads. Both types are available as flanged units with external or internal gearing and induction-hardened raceways.

www.rarodriguez.co.uk

'Float' capability promotes design

PEM fasteners with unique 'float' capability enable easier mating-thread alignment during attachment and promote design flexibility for relaxed tolerance applications. The family of floating fasteners includes captive panel screws (Types PF11MW and PF12MW) and self-clinching nuts (Types AS, AC, LAS, LAC, A4, and LA4). All install easily and permanently in thin sheets.

Floating captive panel screws (Type PF11MW with knurled cap and Type PF12MW with smooth cap) reliably install into metal or non-metal panels as thick as 0.63"/1.6mm, enable subsequent access to an assembly, and compensate for up to .060"/1.52mm mating hole misalignment. Patented MAThread anti-cross threading technology corrects off-angle installations, aligns components, and slides through clogged internal threads, and a shoulder on the retainer portion of the fastener helps simplify installation. Thread sizes range from #4-40 through ¼-20 and M3 through M6 and available options include a scratch-proof DuraBlack finish. Assorted colored plastic caps are also available.

www.pemnet.com

Heads in the cloud

To say that cloud computing is a hot topic at the moment would be an understatement. This is particularly the case in the consumer world, where the hype is generally around Apple's iCloud, Google Docs, Amazon EC3, and the like. But the philosophy behind cloud computing is not really anything new with its origins going back to the early days of computing. So what exactly has changed? And, more importantly, what does it mean for design engineers?

Big innovation has often come from industry before being rolled out into more commercial applications. But things are changing. Cloud computing has already been heavily developed and rolled out into the consumer space and it is only now being trickle-fed into engineering.

The plethora of devices now used to access the same information has also increased massively. People might have a PC at home and at work, a laptop, a smartphone and even a tablet computer. But they want to be able to access their most recent information on any of these devices, at anytime. It therefore makes a lot of sense to migrate this data onto the cloud. But while this makes a lot of sense for many office and home users, for design engineers there are many challenges to overcome before the potential benefits can be realised.

Perhaps the most obvious area to use cloud computing is with a CAD system. The goal is to have a significantly lower hardware requirement than present and offer online access to powerful simulation, synchronisation, rendering and modelling capabilities.

The CAD giants are not quite there yet. To go to a website and log on to CATIA or PTC Creo and begin 3D modelling is not yet a possibility. Anyone that has tried using LogMeIn with a 3D CAD system will know that the bandwidth on most networks is simply not good enough. Driving multiple high-resolution CAD monitors requires large quantities of processing power for graphics handling.

However, there are real solutions being rolled out. Dassault Systèmes, for instance, has long made clear its belief that the cloud is the future for CAD and PLM and its Enovia V6 is a cloud platform (see page 20). Meanwhile, Autodesk, too, has made a number of recent announcements about using cloud computing and is making this technology available and practical for design engineers.

Autodesk vice president of suites and web services, Andrew Anagnost, says: "Mobility and distributed workflow play together and are important aspects of cloud computing. If information sits in the cloud, you can access it anywhere, at anytime, and you do not need a complex infrastructure to do that. It can be very elastic and reactive.

"At [the cloud's] centre there is this core infrastructure; large installations of computers which are the basis for what makes up cloud computing as we know it."
Tristan Jones, National Instruments

"But we are extending it into another dimension and overlapping that with computing power and that is where it gets really exciting about how the cloud can be applied to design. It is not just about doing big simulations, but about exploring options in a way that you have not been able to before. You could look at it that large simulation files run in the cloud are processed faster. It does do that, but it also comes back in the same time, with five or six optimised design variations, for minimal material use, strength or whatever. People have not been able to do that before unless they were NASA or a very large firm with supercomputers. Now everyone can access that processing power via the cloud."

As well as powerful simulation, it is also improving the resolution of rendered images in less time for better visualisation and with reduced hardware costs. Additionally, Autodesk is to launch its PLM system exclusively on to the cloud from March. So how long before designers will be able to log in to Autodesk Inventor and work exclusively online?

"I think within three years, all of our major applications will be on the cloud," says Anagnost. "That doesn't mean all of our users will be using them, but it is quite likely all of our major applications will be accessible online. But for that to happen the bandwidth has to expand

What is cloud computing?

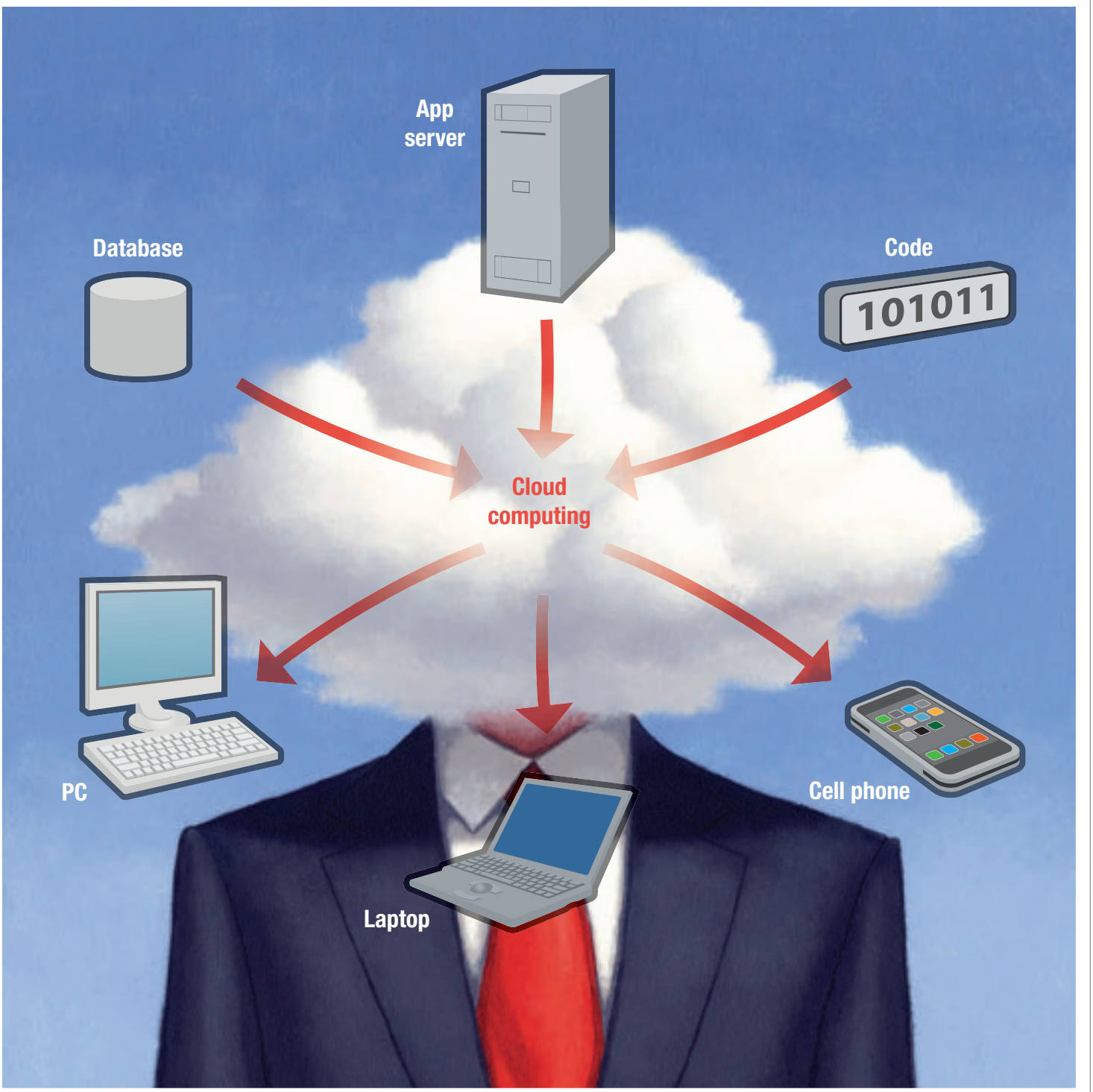
Cloud computing, if you didn't already know, is all about offering software as an online service. This alleviates the need for installing large chunks of software on individual machines to allow access to a computer application or program, whether it is for storage or something like email, via the web.

When computers were the size of rooms and very expensive, users would tend to operate a mainframe and terminal computing model. So the mainframe would run all the important code and separate small user devices would handle the data input and output.

The same kind of thing is happening today. Massive data centres the size of office blocks and warehouses store and compute data that can then be accessed by any number of devices in any location that has an internet connection. But essentially this has been going on for some time. Hotmail, for example, is essentially a cloud based email application, flicker too is the same thing for pictures.

Tristan Jones, technical marketing team leader at National Instruments, says: "At its centre there is this core infrastructure; large installations of computers which are the basis for what makes up cloud computing as we know it. That processing power and storage can then be accessed on different devices from smartphones to PCs."

Is the sky the limit for the possibilities offered to design engineers by the cloud? Justin Cunningham finds out what is on offer and where it is leading.



and our technological approach has to change a little bit, too. The reason I am so optimistic about this is that this stuff is changing very quickly. We have already done some experimentation with it and there are some other technological barriers to overcome for the full 3D modelling experience, but those dominoes are falling very quickly. Three years is not an outrageous timeframe at all."

It makes sense that large design projects that are being carried out by hundreds of users, often simultaneously and thousands of miles apart, is managed and brought together in a cloud system. But it opens up another possibility and the concept of the 'petabyte' age. Sensors everywhere, infinite storage and clouds of processors giving the ability to capture massive amounts of data. Every car crash, for example, will record the data from the crash. Data from millions of instances of the same activity will be recorded and made available. And that will have a fundamental impact on the way engineers approach design.

Tristan Jones, technical marketing team leader at National Instruments, says: "Whereas we might take a snapshot of data at the moment and use this to form the basis of a theory or model, this will allow you to take actual real-world data. Take for example a bridge; it could have hundreds of strain gauges mounted on it that give years of continuous readings. That data will enable us to extract new and interesting information and allow us to see things as they really are.

"Rather than come up with a theoretical model of how a system might work, you will be able to get hold of the real-world data for what the system is actually doing and use that as part of the design process."

In the nearer term, however, National Instruments has produced a cloud-based version of its measurement, test, and control system software called Labview Web UI builder. Normally Labview, like CAD software, is time consuming to install and get going. But NI says the expectation of much quicker access to specialised software is shifting.

"Students especially are used to going to websites, logging on and accessing very powerful design, scientific and engineering tools in a very easy, low-installation, way," says Jones. "The willingness of businesses to take up this approach and apply it to developing applications in the cloud is an increasing area of interest.

"Applications can be built and hosted in the cloud so that, when you go to the website and use the development environment – and when it comes to compiling code – it is passed off to NI.com. We rent some space on the Amazon Elastic Compute cloud-based servers that compile the code. This is then sent back to the users web browser where it can be deployed down on to applications and run."

Like many firms going in to the frontier of offering services via the cloud, the business model with regards to charging for these services is still far from concrete. Whether this takes the form of a yearly subscription for a log-in name or a monthly utility-style bill for usage remains a big question for many.

"The technology is there as is the willingness of businesses to take up the technology," says Jones. "But, how does the business model actually work in terms of providing the service and charging for it? That is the interesting bit."

Control and automation supplier M.A.C Solutions based in Worcester has also recently launched a cloud-based offering of its products. Its WEBfactory 2010 Everywhere is a process visualisation and HMI software suite for the control of industrial processes. Users can choose to display visualisation pages in any web browser, including Internet Explorer, Firefox, Chrome or Safari.

Dennis Price, product manager at M.A.C Solutions says: "WEBfactory is the world's first genuine web-based visualisation system and cloud computing solution for SCADA systems. It can also be installed as a standalone SCADA system, providing all of the added benefits that a SCADA system offers.

"The software is very cost effective for the customer because customers only buy what they require at that time. The user can then expand the software over time in a practical, cost effective manner by means of modular software add-ons."

> "WEBFACTORY IS THE WORLD'S FIRST GENUINE WEB-BASED VISUALISATION SYSTEM AND CLOUD COMPUTING SOLUTION FOR SCADA SYSTEMS."
>
> **Dennis Price, M.A.C Solutions**

All applications run over the Internet and require no separate installation on the display device and thus no change to the existing IT infrastructure. WEBfactory is also 100% ActiveX and JAVA-free, as they are often seen by IT departments as potential risks to security and blocked.

Also included in WEBfactory is its 'Smart Editor'. This simplifies the professional design process, enabling the user to quickly assign, via drag-and-drop, parameters to the machine installation for improved page visualisation.

WEBfactory Symbol Libraries provides users with a comprehensive library of symbols and animated graphics. Templates can be saved in the library and reused or adjusted for subsequent installations, saving valuable design time for the user. Importing data and graphics from existing systems is also straightforward.

The consumer market does seem to be driving the rollout of cloud-based systems and it is a trend that is very likely to spread to industry. The only question is timescale. There are still severe limitations in terms of bandwidth for utilising CAD systems via the cloud, with only limited access to certain parts being available. But the question is when, rather than if, this will be overcome. And it is looking like it could be sooner rather than later. Perhaps as little as five, but certainly within 10 years it is feasible that all CAD and PLM systems and providers will be accessed via a pay-as-you-go subscription service.

As for the rollout of real-time sensors that are everywhere, the continuing fall of computer chip prices and the proliferation of sensors being installed in buildings, cars and aircraft is happening. But it is likely to be some time before engineers will be able to tap in to this data and it has a fundamental impact on design.

www.autodesk.co.uk
www.national-instruments.com
www.mac-solutions.com

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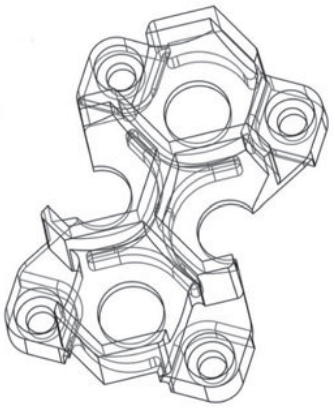

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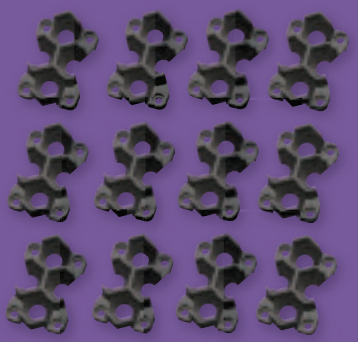

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The target man

Meeting our environmental targets and our need for energy is a difficult balancing act. Max Gosney asks energy minister Charles Hendry how it will be done.

Government commitments to cut carbon emissions by 80% by 2050 and to achieve 15% of our energy from renewable sources by 2020 are, by any standards, daunting. Where and, more importantly, how this will happen is the business of Charles Hendry MP, Minister of State for the Department of Energy and Climate.

When questioned about these targets, however, he says: "I've always been very critical of targets. Of course government needs to have an ambition and its job is to aspire to do better, but alongside that, they have to be realistic. So what we've done in the renewable roadmap is to say these are the technologies that deliver 90% of the way to 2020 and to look at where the barriers are to their development."

These barriers, of course, include serious doubts over whether the current technologies designed to allow renewables to make up a greater share of the energy mix are technologically capable of doing so. When asked this question, Hendry says: "I totally agree. The work we've been doing in the offshore wind sector has been on how we can bring down the cost by 40%, so we set up an industry-led task force whose aim was to bring down the cost to £100 per MW/h, making it much more competitive. We expect the costs for offshore wind to start coming down significantly and new technologies are driving that cost reduction. At the moment, people are seeing whether they can develop a 6,7, or even 10MW wind turbine that can work effectively offshore and, as that technology becomes more established, it can make a big difference."

A strong position

He continues: "At the moment, what's tended to happen is that they've taken an onshore wind turbine technology and seen how they can develop it offshore. What we're increasingly seeing now is the development of a true offshore wind turbine industry. By leading on the cost reductions, the UK is in a strong position to lead that work. We can also do more to encourage the manufacturing expertise and the manufacturing jobs to come to the UK as well."

Another area in which the Minister sees potential for growth is in the rise of the nuclear industry, to which the Government has committed itself. He says: "The scope for the UK to lead development in this area is greater than it's been for many years. We have been actively removing the barriers to investment in new nuclear. I think we are certainly the most interesting place in Europe and one of the most interesting places in the world when it comes to opportunities for new nuclear development." Eight nuclear sites are proposed by 2025 and Hendry claims that fears over an energy shortfall in the interim are misguided.

Another area for which Hendry is responsible is the question of energy savings and efficiency in industry. "We do still have some of the cheaper energy prices in Europe," he says. Figures suggest otherwise, with UK manufacturers paying the fifth highest electricity prices in the EU according to DECC. Yet the statistics are distorted without factoring in energy efficiency says Hendry. "If you look at the cost per unit we're still cheaper than most. But if you look at how many units we consume because we're less energy efficient than other countries we end up using more."Here, he believes, is an opportunity for industry to save itself money and reduce its carbon footprint. He says: "If you look at the cost per unit [the UK] is still cheaper than most. But if you look at how many units we consume because we're less energy efficient than other countries we end up using more.

"People occasionally say that when we're talking about energy efficiency we're berating people, we're being condescending and they've done it already."

"People occasionally say that when we're talking about energy efficiency we're berating people, we're being condescending and they've done it already." The Government's real intention is to spur further energy savings, the minister adds. "Last year we decided to cut our carbon footprint at DECC by 10%. Without spending anything at all just involving all our staff – we've cut it by 20%."

Even so, the Government has taken measures, says Hendry, to address the burdens imposed by the cost of energy, pointing to the fact that the Autumn Statement tabled a £250m energy rebate from 2013 for "energy intensive" manufacturers. "The measures are designed to protect some of those companies that are strategically important to the UK and are most affected by high prices."

Clearly, the balancing act between maintaining the energy supply at a cost that keeps UK industry competitive and shifting energy generation to more sustainable technologies is never going to be an easy one. Equally, it is no exaggeration to say that, unless the balance is found, the UK engineering industry will pay a high price.

Addressing material shortcomings

The Advanced Engineering Show offered the chance to see the solutions being developed to improve advanced materials and address their shortcomings. Justin Cunningham reports.

The Advanced Engineering show held at the National Exhibition Centre (NEC) served up a host of innovative materials for engineers to assess and critique. The sheer number of materials available on the market has never been more varied. But there is no perfect material and it is up to engineers to find the best fit for the product or application at hand.

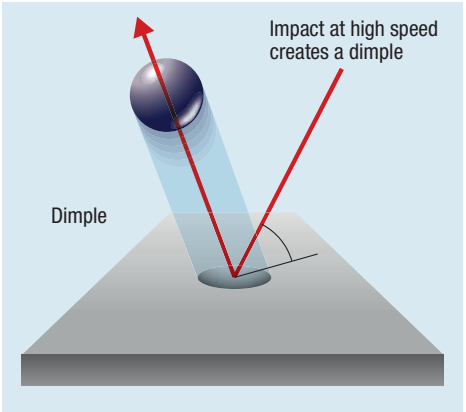
Material selection in the early design phase dictates later engineering and manufacturing processes and increasingly lifecycle and disposal considerations. However, the material world is ever challenging traditional thinking and changing conventional wisdom.

The Metal Improvement Company based in Berkshire talked about advancemes in controlled shot peening. As the process maximises the life and properties of metals, it is an ideal process for design engineers looking to take weight out of structures or improve the reliability of key metallic components.

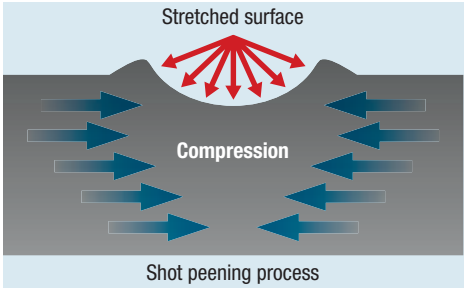
Many engineers may have forgotten about the process from their university days, but the metal surface treatment is well used in many industries, notably aerospace, to enhance fatigue performance by up to 1000% and therefore extend the life of critical components. It is also excellent at stopping and delaying cracks and crack propagation. A multitude of industries are increasingly turning to the technique from rail, medical and automotive down to components such as fasteners, valves, bearings and hydraulic fittings.

The process uses small, high-quality spherical steel, glass, or ceramic shots and fires them at a metal substrate. The impact causes a small dimple on the metal surface, which essentially carries out a very small and localised amount of work hardening. This process yields the material in tension with further movement restrained by the core resulting in surface residual compressive stress.

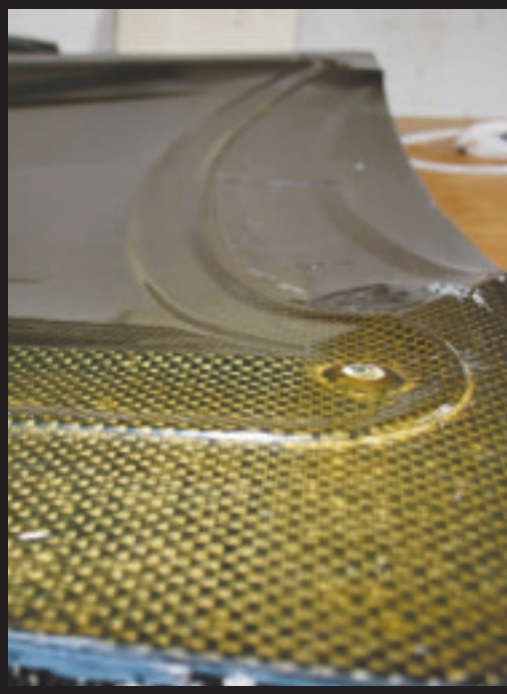
The process has also been advanced with the advent of laser peening. As the name suggests the process uses a laser to induce the same residual compressive stresses in metals. However, the laser is able to penetrate up to 10 times deeper than conventional cold working techniques with virtually no surface disruption. The process is clean, controllable and offers designers the ability to place residual compressive stress into key areas of components to retard crack initiation and growth, and increase fatigue strength.



Tiny spherical shots are fired at the surface...



...resulting in residual compressive stress



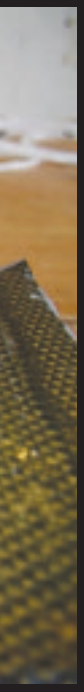
Fibretemp uses the carbon fibre strands as electrical conductors

The show was also an opportunity to find out from Composites UK, the trade body of the composites industry about the state of play of the advanced engineering materials sector in the UK. While it is clear that the overall use of the specialised engineering material has increased, its difficult manufacture still remains a confining factor to its use in lower volume niche applications.

The problem is that composite fabrication is still quite labour intensive and requires curing, often in large and expensive autoclave ovens. The manufacturing challenge is the major barrier to entry for many firms using carbon fibre. Despite the advantages of being extremely strong and lightweight, the cost and time of production puts many off.

The relationship, understanding and interaction between design and manufacturing engineers is something that some firms do better than others. But nowhere is the relationship more important than when working with composites. Engineers from both camps need to be more aware than ever of potential manufacturing principles and know just what is possible.

Out-of-autoclave technology is improving



As current passes through the fibres the material heats up. This phenomenon is exploited to heat and cure the material

massively with the aim of offering firms considering the material a much lower capital investment cost. Derbyshire based Ebalta UK was showcasing its solution at the show that it hopes will enable higher volume and faster throughput of composite manufacture.

The process called Fibretemp allows the production of composite parts in either a resin infusion system, resin filled carbon fibre prepreg or standard wet layup procedures, without heating or post-curing in a large scale ovens or autoclaves.

Fibretemp uses the carbon fibre strands as electrical conductors. As the resistance of carbon fibres is much higher than metals, when a current is passed through it, it heats up. This phenomenon is exploited to heat and cure the material as current passes through the fibres.

Fibres positioned parallel to current flow act as conductors whereas transverse fibres distribute current all over the surface leading to uniform temperature distribution over the mould surfaces. A flexible copper strip is fed into each side of the mould which is connected to a control module, a low voltage transformer, allowing the heating to be precisely controlled.

Increasingly design engineers are being asked to consider the lifecycle of products and certainly many materials are bound by legislation that dictates their proper disposal. However, carbon fibre is notoriously difficult to recycle with a lot of products expected to go to landfill unless nothing is done.

As a result, an initiative by a group of UK companies to reuse and recycle carbon fibre material was launched at the show called Fibrecycle. It aims to recover carbon fibres from waste and develop reprocessing techniques while addressing material shortages, lower cost carbon fibre feedstock and develop novel property combinations.

The recycling processes that are to be developed and used include pyrolysis. This continuous or batch process burns off the resins with limited oxygen. The recycled fibres are then sold in milled, chopped or pelletised forms. Microwave pyrolysis is also under development in the UK, Germany and the US.

Another method developed by the University of Nottingham uses a fluidised bed. Cured and uncured composite materials are fed into a bed of sand where the fibre length is reduced to approximately 25mm. The sand is fluidised with a stream of hot air at 450-550°C. This forces the polymer to break down and vaporise, releasing the fibres and filler which are carried out in the gas stream. The resin is fully oxidised in a combustion chamber where the heat energy can be recovered.

The third method known as solvolysis, also known as a supercritical fluid process, sees the resin recovered as well as the fibres. High temperature and high pressure is required to reach a supercritical state with water, propanol or methanol used.

The resulting yarns and fabrics can then be blended with a carbon/PET and this can be sold at a lower cost than similar products currently available on the market. In common with other co-mingled and blended materials, the fabrics are simply placed in a mould tool under pressure and passed through a heating and cooling cycle so manufacture is also straightforward. Carbon fibre/PET composites offer 50% of the tensile strength and 90-100% of the tensile modulus of an equivalent composite based on virgin fibres.

Project manager, Dr Sophie Cozien-Cazuc of the Advanced Composite Group, says: "The materials that have been developed have a significantly lower environmental impact than virgin carbon fibre, because they divert materials from landfill and do not consume the energy needed to produce new fibres. The properties achieved mean that it is suitable for many applications especially in the automotive, aerospace, sports and leisure, medical and energy sectors."

www.metalimprovement.co.uk
www.compositesuk.co.uk
www.ebalta.co.uk
www.fibrecycleproject.org.uk

Design Pointers

- Controlled shot peening maximises the life and properties of metals
- Laser peening is able to penetrate up to 10 times deeper than conventional cold working techniques
- An out-of-autoclave composite curing process called Fibretemp uses the carbon fibre strands as electrical conductors to heat and cure the material
- Disposal and recycling of carbon fibre is being developed and rolled out

£120,000 rebates– **are you missing out?**

SME manufacturers are missing out on windfalls of up to £120,000 by failing to claim R&D tax credits. Eureka gets the lowdown from Government Grant & Tax Consultants on a valuable funding stream that has passed beneath many businesses' radar

What is an R&D tax credit?

The definition of R&D states that you need to be 'seeking to achieve an advance in science or technology'. This can comprise seeking to create new technical knowledge, appreciable improvement and/or the development of new capabilities.

You also need to be overcoming 'technological uncertainty' to qualify. The guidelines state: "Technological uncertainty exists when knowledge of whether something is scientifically possible or technologically feasible, or how to achieve it in practice, is not readily available or deducible by a competent professional working in the field." It is fair to say that this all-important caveat favours the interpretation significantly.

Qualifying development within a manufacturing environment can involve characteristics of iterative testing, integration between legacy components, processes or systems, making something lighter, faster, more secure, cheaper to manufacture or stronger. A qualifying R&D theme for manufacturing companies could easily be a development project aimed at increasing throughput rates, without compromising quality.

The case for your R&D claim does not need to rely on having a unique or 'industry first' end result. Instead, we need to assess the journey of how you got to your end result, not forgetting that failed projects can also qualify!

How much money is available and how is this influenced by the size of my business?

R&D tax relief is HMRC's largest single funding mechanism to SMEs. Prior to April 2011, a claim for an SME could result in a net cash benefit of 21% of the qualifying expenditure. After April 2011, this could be as high as 26%, rising again in 2012 to 31.25%. If your company qualifies under the Large Company scheme, the net cash benefit is around 8%. You need to be a limited or Plc incorporated company – sole traders and partnerships do not qualify. However, it is worth noting that an SME still has a claim to R&D tax credits if it is loss making.

HMRC's stated average SME claim is £40,000. Given you can go back two years, plus your current financial year, that's a potential £120,000 for first-time claimants.

The R&D tax credit is rising to 200% this year and 225% in 2012 – why?

In his March 2011 budget, George Osborne stated he wanted

Injecting fresh funds

Product innovation and R&D are at the heart of Luton-based Warden Plastics' business – design and production of injection moulded and extruded products, and pertinently the manufacturing and marketing of a Biomedia range, used in the waste treatment industry – so achieving tax credits for this work proved a welcome bonus.

Yet until Warden Plastics was contacted by GGTC, they had no idea that tax relief or tax credits for R&D and innovation existed. With GGTC on board, and after careful preparation, claims were made for two major R&D projects – Biomedia, a filter media for the biological process used in sewage treatment plants, and a Balloon Stick used to display promotional balloons. GGTC carried out all the claim preparation work, with Warden supplying accounts and project information.

Within six months of starting the claims process, Warden received a cheque for a five-figure sum. Managing director Mark Barrett comments: "GGTC were very good; their communication and feedback kept us up to speed. The information and support they gave us along the way was excellent. They are a very good partner." And he adds: "Our accountants are very good and very reputable, but GGTC are specifically geared up to deal with this sort of claim."

In association with Government Grant & Tax Consultants

getty images

Top tips for applications

1. Financial analysis: Accurate and concise financial analysis that is compliant with R&D claim standards
2. Technical analysis: Structured and in-depth reporting, undertaken by an equivalent competent professional, on projects that fall within the realms of R&D
3. Presentation: Claim compilation that will enable HMRC ease of claim assessment
4. Compliance: Understanding the DBIS guidelines and the rest of the CIRD manual to ensure the projects and sums claimed for fall within the prescribed parameters and are correct, from a tax and accountancy perspective
5. Boundaries: Correctly identifying the areas of projects that can be claimed for and where the technological uncertainty, and the work to rectify it, starts and ends.

to attract more companies back to Britain and stimulate the economy. The way forward is investment and encouraging innovation, echoed by the Dyson Report, and the changes in uplift percentages represent a bridge in achieving the overall increase in net cash benefit for companies.

There's no such thing as a free lunch – what does the government get back? What strings are attached and is there an application cost?
No strings. The government is investing in technology companies, plain and simple. When you look at any period in history where there has been financial turmoil, investment in R&D at an industrial level has fuelled the recovery.

Qualifying criteria

Do all SME manufacturers qualify for tax credits?
Assuming the claimant meets the qualifying criteria, any firm can claim, regardless of its profits, turnover or losses.

You mention that any business "innovating, improving, developing or adding value to products or manufacturing processes" can qualify – can you be more specific? And how do you measure innovation or added value in applicants?
The phrases in the guidelines are vague in this respect, in order to make the scheme as flexible as possible for all industries and sectors. A key test is the judgment of a 'competent professional', mentioned earlier. This really means that it is vital that technologists assess the activities included in the R&D claim. Identifying the boundaries of the qualifying activities means understanding the R&D rules and the technology being developed, and the associated tax and accountancy aspects. That's why we advise engaging a specialist to prepare and maximise a claim.

**For companies whose estimated claim is below the HMRC average for SMEs, GGTC will still be happy to provide the free consultation*

How is a successful claim paid? Am I obliged to invest the money in R&D fields?
The money comes from HMRC as one lump sum and we usually find it is invested into areas of further development or staff costs. However, there are no restrictions on how the money is reinvested.

How often can I apply for credits?
Every year, for as long as the company undertakes scheme qualifying activity.

What do I do next?

How long does the application process take, both in terms of form filling and meetings with GGTC officials?
From initial engagement, to HMRC claim pack submission and cash out, is usually three months. GGTC compiles the claim pack (technical report and financials) and ensures the maximum claim, leaving the client with the benefit.

Is it a complex application process and do I need third party advice?
The simple answer is 'yes'. We get involved, so companies can focus on (and ultimately reinvest in) their core activities – in this case, manufacturing.

Act now

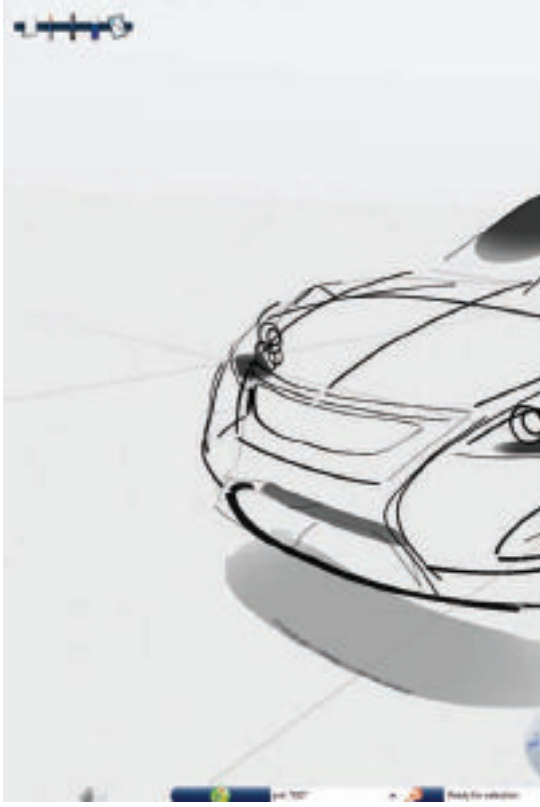
GGTC specialises in identifying, preparing and maximising R&D tax credit claims for its clients, in accordance with HMRC's processes.

GGTC is offering *Eureka* readers a free consultation and 10% discount* on the claim success fee.

Simply call Todd McCully on 01727 738600 or email todd.mccully@ggtc.co.uk.

Sketch tool makes debut for Dassault

The recent Dassault Systèmes European Customer Conference had a number of messages, but only one new product. Paul Fanning reports.



Taking place at Disneyland, Paris, Dassault Systèmes European Customer Conference served largely to emphasise a number of the themes that have been emerging from the company in recent times, although there was a launch of a new piece of design software.

One of the key themes repeated by the company's CEO Bernard Charlès at the ECF was the importance of "lifelike experience" in the company's ongoing development of its software. Quite what form this lifelike experience would take remains something of a mystery, but in clarifying, Charlès said: "We want to create virtual universes that enable realistic simulations to facilitate the emergence of new products that better fit with the environment and consumer expectations. This is not only Product Lifecycle Management, but placing the product in life, which means its integration into, its use in, and its impact on the environment. We are committed to using our solutions to help better understand and simulate how nature, life, and the product can interact in harmony."

This, of course, will be achieved via Dassault's V6 platform. V6's single, open and web-based scalable platform is designed to allow users to engage in global collaborative innovation practices. However, it is clear that, while there are a number of high-profile adopters, widespread adoption of V6 is still a some distance from taking place. A suggestion of how long Dassault believes this transition is likely to take can be drawn from the fact that the company has stated that it will be supporting CATIA V5 until 2020, allowing customers make the transition from V5 to V6 on their own terms and at their own pace.

Of all the software vendors, Dassault has probably been the most enthusiastic about the adoption of cloud computing and the development of products designed for the shift to this model. Enovia is represented as being the only online cloud platform and Charlès was as enthusiastic as ever in his advocacy of the cloud, saying: "I believe it offers us a platform to deliver a whole new range of possibilities."

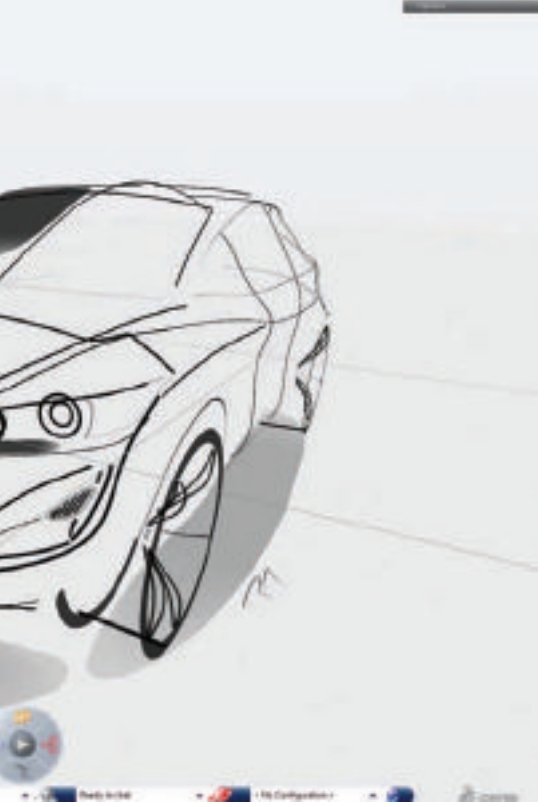
Faced with questions about the security issues associated with cloud computing, Charlès conceded that few customers were operating via a public cloud, but claimed that many were using what he called a "private cloud", saying "It works! It's possible!"

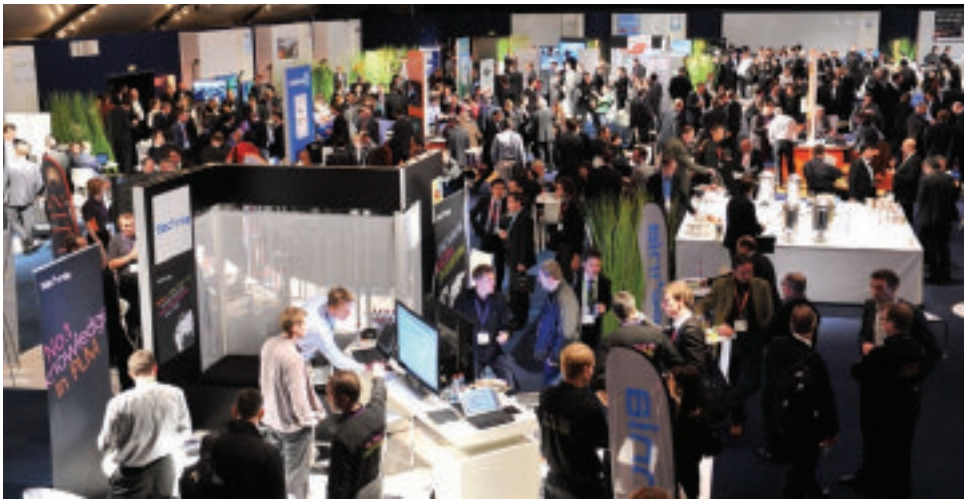
Ultimately, he suggested that fears over the security of cloud computing were exaggerated, saying: "Most of the systems our customers use are not much more secure than any other online system. That's the reality!" He went on to suggest that security was "just one small topic" in the issue of cloud computing, saying that things such as sovereignty and the need to follow different laws for different countries while using the cloud could present an even thornier problem.

While much of the ECF was taken up with discussion of Dassault's strategies and philosophy, there was a new product launched at the event as well – albeit with rather less fanfare than one might have expected. This was particularly strange in as much as the product itself is an interesting and exciting one.

Called CATIA Natural Sketch, the product is a 3D sketching experience that brings together the intuitiveness of creative 2D painting gesture and the power of accurate, realistic 3D modeling by allowing users to draw editable, malleable Spline objects in 3D space. For most designers, sketch is

Janine Benyus, author and president of Biomimicry 3.8, addressed the Forum





the medium of choice to express what they have in mind. By making sketching in 3D as intuitive as sketching on paper, CATIA Natural Sketch brings a revolutionary experience that matches creative purposes while removing emotional barriers towards 3D creation.

According to Anne Asensio, VP Design Experience, Dassault Systèmes: "Dassault Systèmes is continuously striving to make the power of its widely recognised 3D creation solutions accessible to a larger audience with the right experience empowering designers with intuitiveness while enhancing their creativity. To turn dreams into reality, we have successfully brought together forward-looking designers and Dassault Systèmes technology experts, resulting in unique registered patents and delivering this unique 3D sketching experience."

CATIA Natural Sketch enables designers to free up their creativity and also eliminates workflow disruptions throughout the industrial design process. These can come about because a sketched 2D idea can turn out to be unrealistic, not feasible in 3D and the process of constructing the 3D models from an original 2D sketch is very time consuming and prone to design intent interpretation errors. CATIA Natural Sketch promotes a new, natural way of designing in 3D, delivering unique value in addressing these challenges and keeping the design intent.

Dassault Systemes CEO Bernard Charlès

Dassault has referred to CATIA Natural Sketch part of CATIA V6, Dassault's comprehensive design suite, but doesn't mention whether Natural Sketch will be delivered as part of CATIA's CAD modelling features, an option plug-in, or an independent title. It is also unclear exactly what hardware will be needed to accommodate the technology.

Sketching in 3D, Dassault claims, allows designers to better understand their design in volume, avoid misinterpretations of 2D views, and better communicate their ideas. It also gives designers and design studio teams the ability to use 3D sketches curves to create the 3D model with surface modeling or subdivision surface modeling tools as it is natively part of CATIA. By directly transforming a 2D sketch into a 3D digital product, it allows the user to avoid inconsistencies between the design intent and the reality, which results in dramatic improvements in terms of design quality.

Following the release of CATIA Live Rendering for intuitive interactive photorealistic visualisation a year ago, CATIA Natural Sketch is the latest key element of Dassault Systèmes' Live Design leadership strategy. CATIA Natural Sketch complements the CATIA for Creative Designers solution, which now combines 3D sketching, concept modeling, class-A surface modeling, rapid prototyping and visualisation.

Natural Sketch is part of the CATIA V6R2012 portfolio along with the CATIA Imagine & Shape products. In addition, CATIA Natural Sketch is not a cloud-based product. Details as to how to acquire it (and how much that would cost), however, were not available at the time of going to press.

www.3ds.com

Picking up good vibrations

Justin Cunningham finds out how an old engineering trick has been refined by new technology.

We all remember stories of the engineers who could hold a screwdriver to their ear and press it against a machine to judge the condition of the rotating machinery inside. To the well-trained ear, those vibrations tell a story.

This principle has been taken up by West Sussex-based Kittiwake, which has developed a Machinery Health Checker (MHC) sensor. The sensor is used to capture the acoustic emissions from bearings and assess their condition.

A special acoustic emission sensor allows the user to listen to the sound signals being generated on headphones where special audio circuitry filters out normal vibrations and audible signals to let engineers clearly hear rubs, scuffing and impacts as they happen.

"It works using a piezo-electric transducer," says Dr Steve Dye, business development manager at Kittiwake. "Traditional vibration sensors tend to have a relatively large weight inside that shakes and this is what is measured and gives a reading. But, if you have high shock instances such as drilling in harsh environments, it can actually break the sensor. Our sensor has much less mass so doesn't get these issues."

Vibration measurements often need a lot of sampling, analysis and diagnostics but Kittiwake wanted an almost instantaneous reading that tells engineers what they need to know. The sensor measures dB – essentially how noisy the bearing is. The other parameter is 'Distress'. This is an indication of how many high frequency impacts there are as the bearing goes round.

'Spikes' in the normal operation of the bearings acoustic emission spectrum are generated by deterioration inside the rotating machinery. This can be shards of metal, corrosion, or an increase in friction.

As the mechanical condition of machinery deteriorates impacts, friction and crushing generates sound waves that span a broad range of frequencies. By detecting only the high frequency part of the signal it is possible to detect miniscule amounts of activity from the slightest of rubs to the crushing of particulates in the lubricant.

"The beauty of this is that it is bearing independent," says Dr Dye. "Normally, when you do a vibration measurement you have to know the bearing type, the size of it and the speed of rotation.

"By coming up with a dB and Distress value straight away it gives you a very quick way of determining the condition of the bearing prior to saying there is a problem. Although it does have the ability to take a spectral waveform to do Fast Fourier Transform for analysis, which is very akin to standard vibration measurements, generally you want to know if the bearing is working well or not. You don't replace the inner race, outer race or the ball bearing if there is pitting, normally you take the whole bearing out and put a new one in.

"This allows engineers to very quickly determine if you have a problem or not. If the bearing is noisy and the Distress level is greater than 10 then it may just need to be re-greased. If it remains high then it is advisable to do some further diagnostic analysis."

The sensors are available in a handheld, standalone version and also as Smart sensors which can be integrated on to machines to take continuous readings that feed back data to a PLC or SCADA. To facilitate sensor coupling a variety of mounting methods are available including magnetic front face, adhesive bonding, bolt-on and screw in. The MHC sensor has two modes, Standard and Super-slo mode which together allow measurements to be taken between 0.25 to 2500rpm.

The Smart sensors are currently being used on the London Eye to monitor the condition of the bearings and have also been used at the other extreme monitoring the wheel bearings of the current land speed record-holding car; Thrust SSC.

www.kittiwake.com

In developing the MHC, Kittiwake wanted an almost instantaneous reading

High pressure transmitters with a difference

Instrumentation specialist Impress Sensors and Systems has launched a range of high pressure, mechanically robust differential pressure transmitters for liquids and gases. The transmitters can take measurements up to 70bar and provide three in one capability including an adjustable four digit LED display, a pressure transmitter and two pressure switch connections.

The sensor called DMD831 is a stainless steel differential pressure transmitter that incorporates two piezo-resistive stainless steel sensors and stainless steel diaphragms. The transmitter is therefore suitable for wide ranging engineering applications.

Differential pressure sensors and transmitters measure the difference in pressure from one side of a diaphragm to another or between two diaphragms.

When pressure is applied, the sensor determines the pressure difference between the positive and negative sides and transforms it into a proportional electrical signal. Typically, this enables the measurement of pressure drop across a filter due to residue building up or blockages, or for measuring flow in a pressurised vessel.

The DMD831 is a cost effective, compact solution for OEMs and end users in a wide range of process industry control applications. These could include situations as diverse as pressure control for lubrication systems, hydraulics and pneumatics, air compressors, steam, water, fuels and oils.

Sam Drury, sales and marketing director at Impress Sensors and Systems says: "The robust, compact design of the DMD831 allows it to be integrated in a diverse range of process engineering and machinery applications, particularly where installation space is restricted. The sensors are also capable of providing a turn-down capability of 10 to 1."

Seven different versions of the DMD831 are available, with differential pressures from 0 to 80mbar up to 0 to 70bar. The transmitters operate in media temperatures ranging from -40°C to +125°C.

Switching accuracy is ±0.5% FSO according to IEC 60770. The transmitters are also ingress protected to IP65.

www.impress-sensors.co.uk

Micro-ohmmeter puts 200A in the palm of your hand

A rugged handheld device weighing just 1kg is capable of carrying out tests at currents up to 220A. The MOM2 micro-ohmmeter from Megger uses an ultra capacitor to achieve the high-current from battery power alone.

The design is a significant improvement from the bulky and more costly conventional high-current micro-ohmmeters that typically weigh 10 times as much. The instrument also operates from rechargeable batteries that give over 2,000 measurements per charge.

The MOM2 is auto-ranging and measures resistance from 1μΩ to 1Ω. The results are shown on an LCD display that incorporates an analogue arc to shows the charge of the ultra capacitor. The instrument is supplied with two 1.3 m test cables fitted with Kelvin probes and a copy of the MOM2 Win software package for convenient processing and archiving of results.

www.megger.com/uk

Load cell range extended

Variohm EuroSensor has increased its range of high capacity load cells with its low profile BM24R series. The range has approval for 'legal for trade' accuracy tests covering loads ranging from 60kg to 60 tonnes in seven sizes spanning 63mm to 140mm.

The hermetically sealed load cell is finished in stainless steel with laser welded diaphragms and a glass to metal cable entry. With IP66 or optional IP68 ingress protection, the BM24R is well suited for use on platform, tank or hopper weighing systems in wash down and harsh environments across the food and beverage, and chemical and process industries.

The BM24R has a Y value of 10000 for standard C3 approval and a Y value up to 25000 for C5 approval.

The load cell range is also available with ATEX classification and with various mounting accessories.

www.variohm.com

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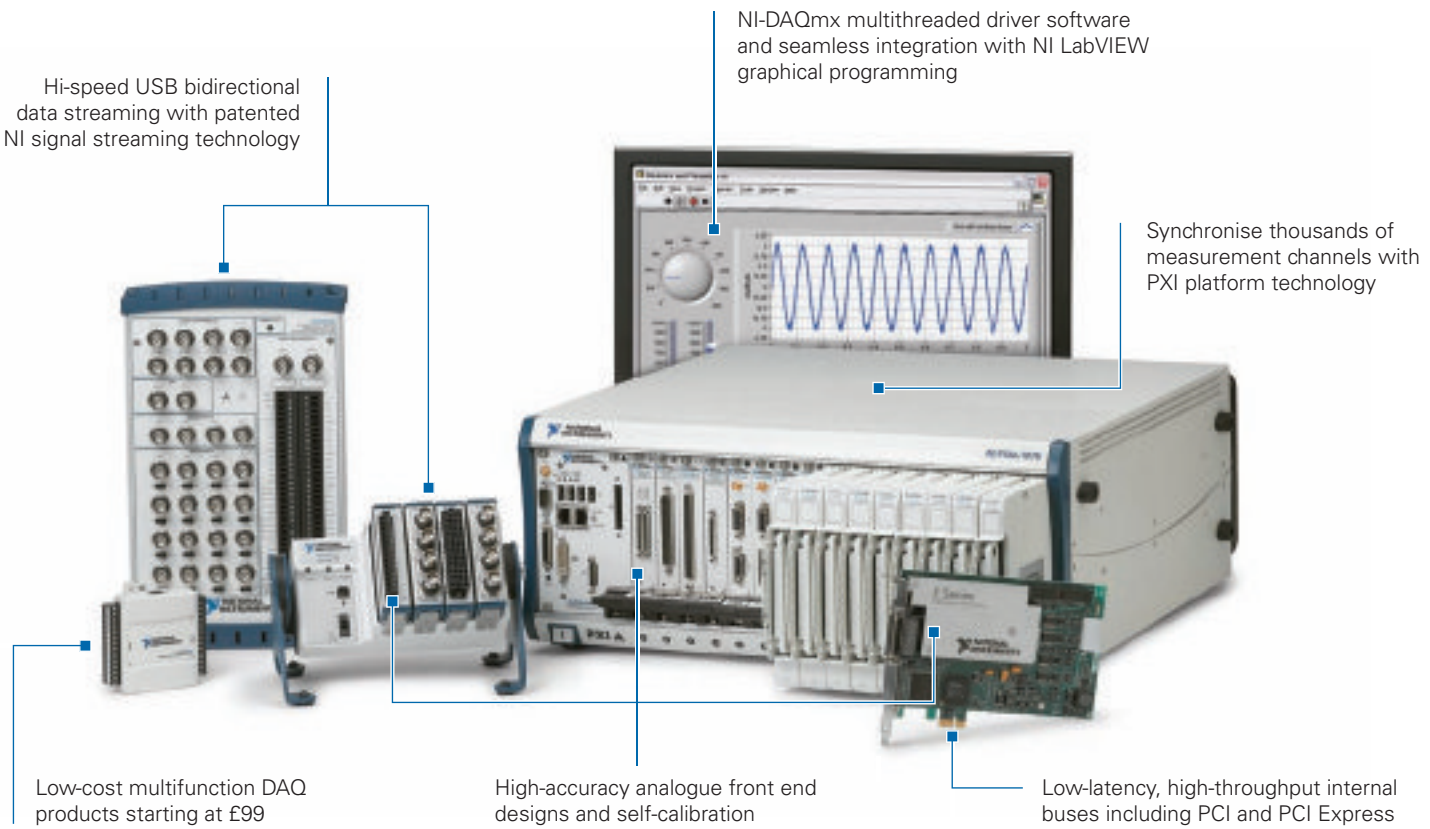

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NATIONAL INSTRUMENTS™

Trying the alternative

Bearings made of non-traditional materials are improving design and functionality in many industries. Justin Cunningham reports.

Bearing manufacturers are increasingly looking to develop and use alternative materials for a variety of different applications. It is being driven by both the demand from engineers for better solutions as well as the result of a concerted effort by industry to open up and engage with new market sectors.

Plastic plain bearings have long been making inroads into the mindset of the design engineer, and while headway has been made in many applications, certain sectors remain largely untapped. Northampton based igus has long been identifying applications where its range of polymer bearings can be used with comparative performance to metallic bearings. The most recent is the development of a bearing for the food and drink industry.

The bearing can be recognised by metal detectors, despite being manufactured from plastic. The US Food and Drug Administration approved material allows the part to be in direct contact with food, where other bearings, such as nylon bushes, cannot. Furthermore the material can touch food and even be ingested, without causing harm.

Matt Aldridge, director of igus UK, says: "We have found that a lot of machine designers and builders are moving to blue components, as this has become the de facto standard, and it is not a sector that we have traditionally been strong in. So we decided to develop a plastic that would enable us to provide a better solution.

"Blue coloured items, ranging from plasters to hair nets, are now widely used in food preparation areas and large scale mass produced food lines, which is why we've developed a blue range of bearings specifically for this industry."

A dye is added to the bearing which slightly reduces mechanical properties, but enables the plastic to still be more than capable of operating in most food manufacture and processing machines. The bearing has high wear resistance, can handle long term exposure up to 180°C and is resistant to a variety of chemicals and other liquids. The plain bearing has a low coefficient of friction, is corrosion resistant and, lubrication and maintenance free.

Bearing specialist Schaeffler has been more traditional in that it is largely known for its metallic bearing products. But, it too, is using alternative materials to develop bearings for new applications and has identified renewable energy systems such as solar, wind, wave and tidal power as being ideal for composite plain bearings. In solar energy systems plain bearings are particularly suited to the operating conditions, which often involve slow swivelling movements at high loads.

Additionally, its metal polymer composite bearings are particularly effective in oscillating applications. The metal polymer is used to provide low wear sliding characteristics, as well as high load-carrying capacities - up to 250N/mm^2 - and high thermal conductivity.

Composite materials can also be used in water or other media due to its high moisture resistance. These products are available as bushes, flanged bushes and thrust washers, and are ideal for applications where there are very small radial or axial design envelopes.

The materials available in the metal polymer composite bearings range include a porous bronze sintered structure applied to a steel or bronze backing, which is impregnated with a special plastic compound. The solid lubricant produces a film between the sliding surfaces, which provides low noise with a low friction coefficient throughout the bearings entire service life.

Schaeffler recently launched its Elgotex range of plain bushes to provide a variety of technical advantages. The products unique, entwined double layer design means each bush comprises of two layers of wound material. The inner, sliding layer is made from synthetic fibres and PTFE fibres in epoxy resin, whilst the outer layer comprises continuous glass fibres in epoxy resin.

Elgotex plain bushes are lighter than their bronze equivalents and highly resistant to corrosive media. They also perform well in applications where swivel or axial movement is required and have good vibration damping properties.

www.igus.co.uk
www.schaeffler.co.uk

Low-friction seal reduces CO2

A new range of low-friction seals manufactured by SKFcan lower CO2 emissions and improve fuel economy. Designed to fit on rotating engine and transmission shafts, the new seals can reduce levels of friction by up to 55%, compared with conventional shaft seals.

The new seals feature a low-friction elastomer lip design based on the wafer technology used for PTFE shaft seals. The new seals also use a specially formulated FKM material with improved compression set and relaxation properties to compensate for the lack of a spring, normally found in shaft seals. The result is a seal design that provides extremely low friction, outstanding sealing security and long service life.

The SKF Low Friction Seal ensures robust sealing and high durability, even at high speed. The seals also provide improved capability on eccentricity and dynamic run-out compared with PTFE seals, as well as good dry-running ability. They provide minimal shaft wear and have excellent dirt exclusion. The SKF Low Friction Seal is also simple to install because no additional sealants or lubricants are necessary.

www.skf.co.uk

Measuring indicator launched for linear applications

The new Linear Measuring Indicator (LMI) from HepcoMotion can be adapted for rotary applications where angular measurement is required. Highly versatile and therefore economical, LMI offers repeatable, precise measurement to improve productivity and reduce rejects in many industrial applications.

It's an ideal addition to an automatic saw, for example, to provide an accurate cut to length facility for metal, wood, stone, plastic, paper or glass. In this regard the LMI's incremental mode is a boon for cutting uniform short lengths from a single billet or for creating partial cuts at regular intervals along its length.

Values are shown on a bright and clear, seven-digit LCD whose display is accessed via a four-button touch pad.

www.hepcomotion.com

Bearings up to 1.5m now available on short lead times

UK bearing manufacturer Revolvo Ltd is offering both standard and bespoke bearings on very competitive lead times. The new service offering is already helping to extend the operational life of older plant and equipment, and reduce downtime with shorter maintenance periods for other items of strategic, production critical machines.

The service is available for bearings of up to 1,500mm OD including deep groove and angular contact ball bearings, cylindrical roller, thrust and split roller bearings. Thanks to a recent investment of nearly £1 million in new CNC grinding machines the lead time for large sized bearings has been reduced to as little as 18 weeks, a dramatic cut compared to the industry average.

www.revolvo.com

NSK offers designer's guide to linear motion

NSK has published a free, pocket-sized guide detailing its market-leading range of linear motion equipment, which is one the most comprehensive and innovative in the world, encompassing everything from linear guides to high technology, Megatorque motors for precision direct drive applications.

Divided into six easy-to-read sections, and extending to 85 pages, the pocket guide provides the most concise and comprehensive guide to NSK's linear motion products. Ideal for use by design engineers, the pocket guide is a mine of useful information, providing general data on equipment types, and easy-to-assimilate graphics that enable engineers to assess the benefits of, for example, groove configurations on linear guides for load carrying capacity and impact loads.

Section one of the booklet, running to over 20 pages, is devoted to linear ball guides: six configurations, including the standard LH and LS, LW, PU, PE and Translide series are all featured.

www.nskeurope.com

Developing smooth torque

***Eureka* reports on how the overrunning alternator pulley is being used to improve the internal combustion engine.**

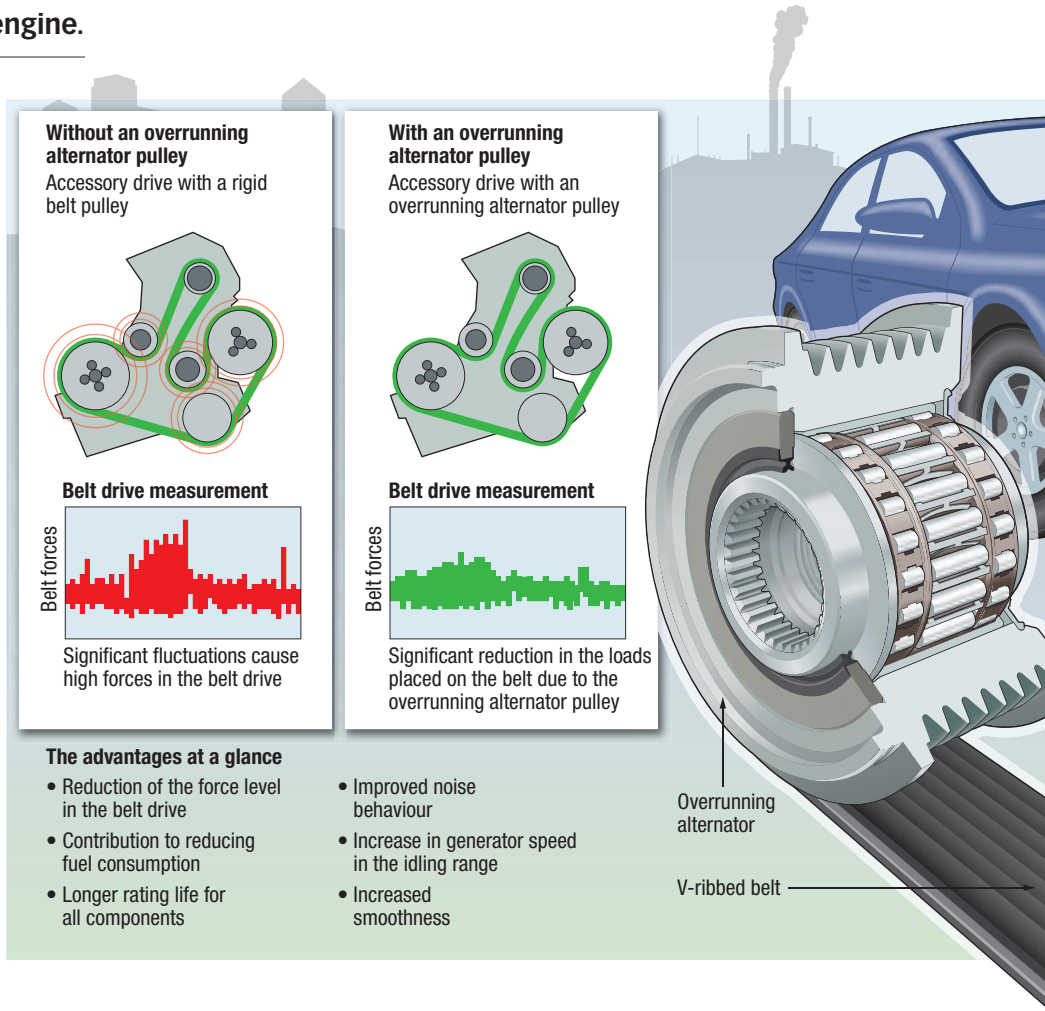
An overrunning alternator pulley (OAP) can play an important part in the smooth running of the modern internal combustion (IC) engine. But it often gets overlooked by design engineers despite the positive effects it can have on energy efficiency.

The function of the OAP is to decouple the alternator from rotational irregularities. This function is critical, particularly as rotational irregularities that occur in IC engines, including those with turbochargers, can be significantly higher than indicated to a driver by a tachometer needle.

In a vehicle's accessory drive, the alternator is the component with the greatest moment of inertia and highest speed. This means that acceleration and deceleration forces acting on the alternator resulting from rotational irregularities have the greatest effect on the belt. Using an OAP therefore ensures that only the accelerating proportion of the crankshaft forces that are transferred to the belt drive are used to drive the alternator.

The advantage of the OAP with a one way clutch is reduction in the force level in the belt drive. This extends the life typically by a factor of 10 of individual components, while ensuring an increase in the generator speed and a reduction in noise. In addition, the engine runs more smoothly. The OAP also contributes towards the reduction of fuel consumption and therefore CO2 emissions.

In urban traffic conditions, where a large proportion of time is spent idling and accelerating, the belt drive with the OAP is subject to significantly lower loads than a belt drive without an overrunning pulley. Use of the OAP also enables more cost effective design of other components in the overall belt drive system.



Volker Ploetz, senior manager of transmission components at Schaeffler Automotive, says: "The overrunning alternator pulley works in a similar way to the freewheeling of a bicycle pedal, whereby only the acceleration proportion of the crankshafts rotational irregularities is used to drive the alternator. The advantages from this include more effective damping of belt oscillations, which means you no longer need idler pulleys or damping pulleys. You also get a reduction of tensioning forces and lengths, as well as improved noise behaviour, reduced belt width and increased system life. The use of alternators with high inertia is also possible. In terms of assembly, the overrunning alternator pulley is easy to fit as no separate fasteners are required."

This important contribution towards improving energy efficiency also explains why the OAP is being so successfully integrated into both diesel and petrol engines. The component was regarded early on as key for eliminating the rotational irregularities from the belt drive of the new generation of high torque, direct-injection diesel engines. It is also now included in an extensive list of measures for optimising

the fuel consumption of internal combustion engines.

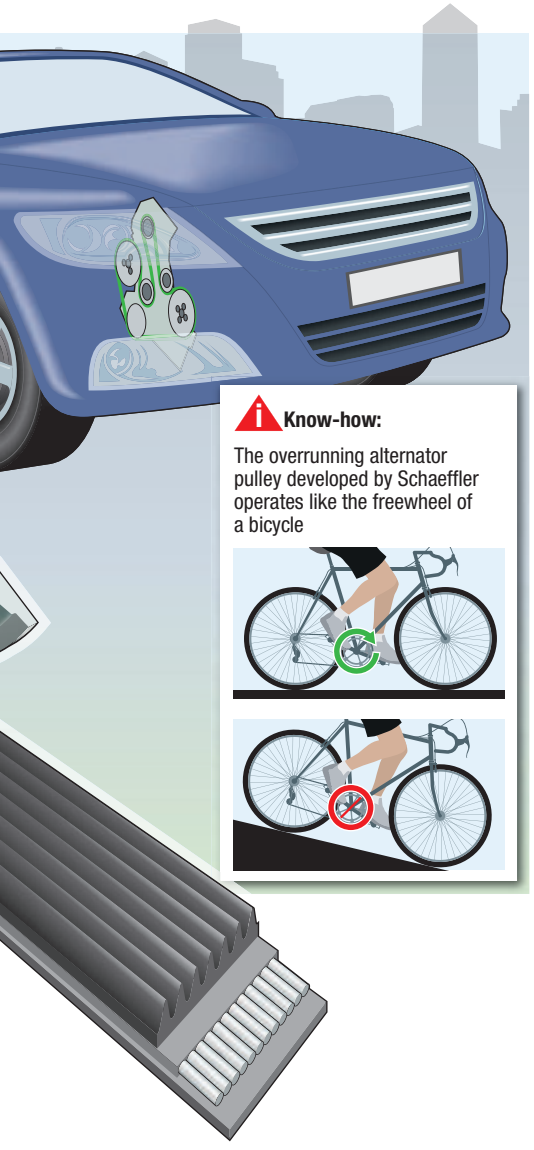
Schaeffler recently showcased the CO2ncept-10% vehicle to presents a range of optimisation options for internal combustion engines that can be implemented in a short space of time to yield significant fuel saving. Here, the OAP contributed to a reduction of almost 1% in fuel consumption.

Dr. Robert Plank, vice president of corporate engineering at Schaeffler, says: "CO2ncept-10% is impressive proof of additional potential for optimisation in a system close to volume production standards. CO2ncept-10% is the sum of the individual components."

A comprehensive modular OAP system has been developed that offers many different custom designs for both diesel and petrol engines in passenger cars, commercial vehicles and motorcycles. These also include an OAP manufactured partly to aircraft specifications, which is used in the Schaeffler Audi A4 DTM competing in the German touring car championship.

The Schaeffler Group currently manufactures more than 400 different types of belt pulley with OAP and it hopes that its positive effect to engine design gets fair consideration by engineers in the future.

www.schaeffler.co.uk



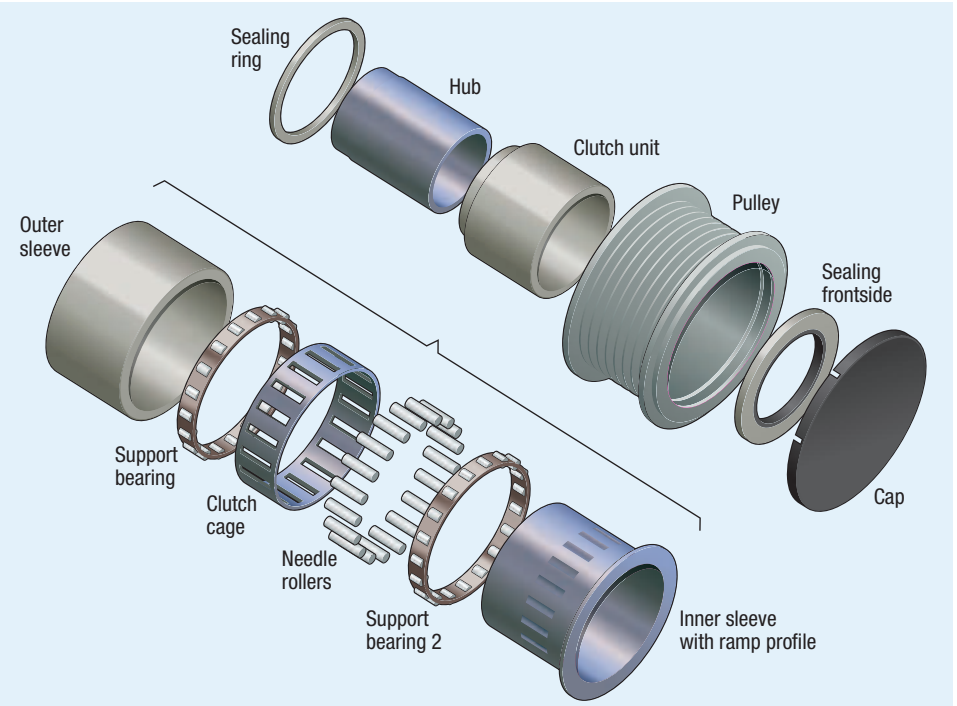
Know-how:

The overrunning alternator pulley developed by Schaeffler operates like the freewheel of a bicycle

Structural design

The overrunning alternator pulley consists of a pulley with an outside diameter suitable for using a poly-V belt, a one-way clutch unit with bearing supports, an inner ring and two seals. Following installation, an end cover is snapped onto the front of the alternator shaft to protect it from ambient media such as penetration of contamination like salt water deposits.

A modular system has been developed for overrunning alternator pulleys to provide an economical and flexible solution for customer enquiries. The one-way clutch unit and the seal components are standard parts. Unlike spring decouplers, an overrunning alternator pulley does not have its own resonant frequency and does not have to be adjusted to varying alternator sizes.



Decoupling function

The function of the overrunning alternator pulley is to decouple the generator from the rotational irregularity of the crankshaft of an internal combustion engine. The large mass of the generator cannot follow the high irregularities of the crankshaft at engine start and drive resonances. Therefore it comes to differences of rotation angle speeds of crankshaft to alternator. Contrary to a rigid wheel the overrunning alternator pulley opens in overhauling direction. The alternator mass and their influences are decoupled from the accessory drive. In addition, the overrunning alternator pulley decouples the alternator's inertial torque during a significant engine speed deceleration such as changing gears.

CAD software cuts hydraulic design time

New 3D CAD software from Parker Hannifin looks set to simplify hydraulic cylinder selection and integration in heavy duty industrial applications using the company's advanced MMA 'mill' type hydraulic cylinders. The new CAD software generates 2D and 3D drawings in standard industry formats, for use with all common design and modelling software packages, and will help engineers reduce system design time, while improving functionality and performance.

Parker's MMA range of standard and custom built 'mill' type hydraulic cylinders is rated for pressures up to 250bar and has been developed for use in demanding applications, such as steel and rolling mills, mining and quarrying, and marine equipment.

In each case, MMA cylinders offer a robust, reliable construction. This is based on high tensile carbon alloy steel, hard chrome plated piston rods, polished to within 0.2microns, with heavy duty steel cylinder bodies, featuring head and cap ends bolted to tough steel flanges and retained by threads at each end of the cylinder body.
www.parker.com

New range of timing belt ring slides

HepcoMotion is offering its customers another choice to extend the scope of its PRT2 product programme.

HepcoMotion has just added a range of ring slides that have been designed with a timing pulley profile. These are available in six sizes complete with pulleys and toothed timing belts as a clean and integrated solution for driven rotary motion.

The HepcoMotion design has a self-aligning V-groove in the pulley which eliminates the need for flanges and the entire assembly provides many performance benefits. High driving force and speed – up to 5m/s at the periphery – are complemented by accuracy and low backlash. Requiring no lubrication or re-tensioning, these new additions also run very quietly.

The HepcoMotion® Timing Belt Ring Slides are manufactured from high quality steel, zone hardened on the V edge and precision ground on all faces except the teeth.
www.hepcomotion.com

Continuous motion for machine signal with igus c-chain

Energy chain innovator igus UK has developed its new c-chain energy chain system, which allows machine signal and media to be carried in continuous motion.

The intelligent c-chain design concept originated from a solution igus developed to eliminate the empty runs that conventional pick and place applications suffer from due to linear motion. The new system moves in a continuous circular motion, smoothly and without vibration at a continual speed of between 2 and 3m/s – creating an increase in productivity of up to 30%. Already used in industrial pick and place applications, the low cost, c-chain kit can be implemented into a much broader market.
www.igus.co.uk

New-generation Compact EHA gives greater flexibility

With the launch of Compact EHA generation II, Parker has added universal orientation and the option of a manual release function, providing greater versatility for the designer and enhanced safety for the operator.

Compact EHA is a fully self-contained, double-acting actuator which offers exceptionally high power density at operating speeds of up to 84mm/s. This makes it a robust and maintenance-free alternative to conventional hydraulic, electro-mechanical and pneumatic systems, in applications ranging from military and aerospace, to marine, leisure, construction and general industrial use.

The new generation of Compact EHA offers benefits for both the designer and end user, with easier specification and enhanced versatility and operator safety. Universal orientation reduces the need to specify and stock different variants as all new Compact EHA models will work in any position. The new manual release option allows the operator to manually move the load in emergency conditions such as loss of power.
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Innovative fastener takes on the oil Industry

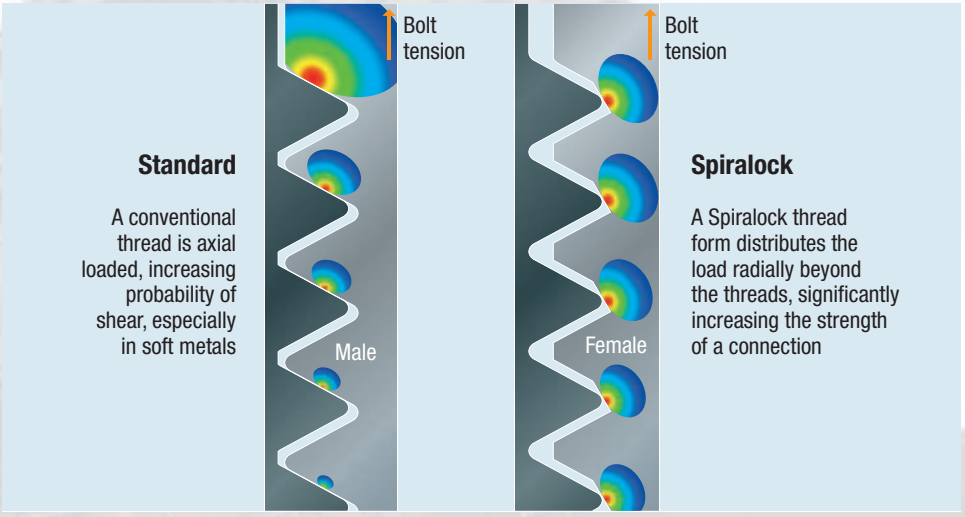
A unique internal thread is helping the oil industry enhance reliability by combatting vibration, thread loosening and extreme temperature. Justin Cunningham reports.

Oil rig operations have some of the harshest operational requirements of any industry sector. The remote, hard-to-reach reserves hidden under the seabed demand deep drilling at high speed. And as reserves dwindle, the result is that ever-greater shock, vibration and temperature is put through critical joints.

The cost of failure or unscheduled service when a million pound component is hundreds of metres below the ground and sea level is astronomically high. Like any mechanical system, fastened joints can be a source of weakness and a potential failure point. It is essential these stay secure with minimal maintenance requirement, particularly in the well bore.

Many design engineers gravitate toward lock wires, prevailing torque fasteners, or adhesives to prevent loosening but these can be less effective in oil rig applications and have a higher cost than traditional fasteners. However, US fastener manufacturer Spiralock says that its internal thread is being increasingly used by the oil and gas sector with great results; improving reliability by combating shock, vibration, thread loosening, and in extreme temperature.

Spiralock claims its self-locking thread provides excellent vibration and temperature resistance without the cost or complexity of a lock wire or special bolt. So when a rotating control device (RCD) prototype for a major oil services company was being designed the decision was made to use the Spiralock thread form to assess its impact on reliability and production uptime.



The previous generation of RCDs had used a lock wire with a special cross-drilled bolt to keep certain fastened joints from coming apart. But wiring the screw head on the RCD required added time, labour, cost, and component space for service maintenance. During drilling the new RCDs meet rig health, safety, and environment challenges by keeping a pressure tight barrier between personnel on the rig floor and rig drilling fluid and gas returns.

Jeff Jungmann, engineering manager at Spiralock, says: "Locking wires require a special bolt and takes time to wire together; chemical adhesive application can be inconsistent and doesn't work well in high temperature; and deformed threads can gall during initial assembly or lose effectiveness in later disassembly and reassembly.

"Spiralock tapped holes and locking fasteners perform well in a high shock, heat, and vibration environment, particularly in the hard-to-cut super alloys like Inconel, P550, and MP35N, which are increasingly needed in deeper, more demanding well bores. Since the locking component comes from its internal thread form, there's no need for chemical adhesives or secondary locking features."

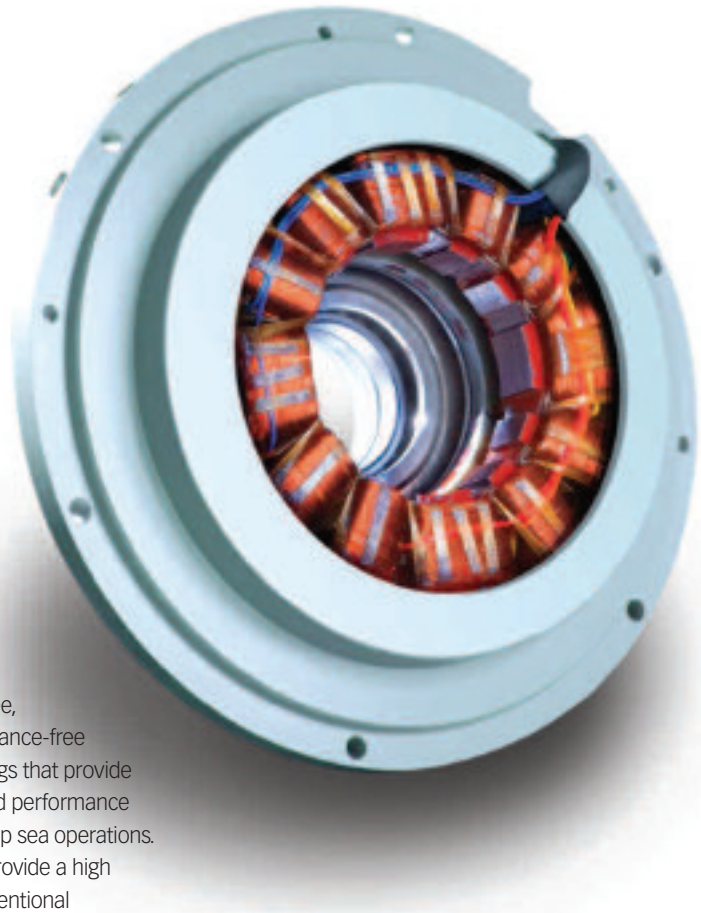
Most locking fasteners do not address a basic design problem with the standard 60° thread. That gap between the crest of the male and female threads can lead to vibration induced thread loosening. Spiralock say its re-engineered thread adds a unique 30° wedge ramp at the root of the female thread which mates with standard 60° male thread fasteners.

The wedge ramp of the self-locking threaded fasteners allows the bolt to spin freely relative to female threads until tension is created in the male fastener. This continuous line contact spreads the clamp force more evenly over all engaged threads, improving resistance to vibrational loosening, axial torsional loading, joint fatigue, and temperature extremes.

www.spiralock.co.uk

Offshore bearings take the strain

Offshore and subsea applications make specific demands of bearings, as Paul Fanning discovers.



Subsea conditions represent some of the harshest and most challenging in terms of bearing technology. Combatting them is something that has forced bearing manufacturers to develop highly innovative and robust solutions using a variety of materials and designs.

Subsea screw pumps, for instance, which help enable oil extraction as low as 3,000m, operate in extreme conditions that test the performance limits of standard steel, journal and magnetic bearings.

Clearly, one of the major requirements of a bearing at such depths is that they are robust, with high levels of corrosion- and fatigue resistance. SKF addressed this need with a bearing arrangement for each rotor consisting of two CARB bearings to accommodate shaft deflection and axial displacement. A four-point angular contact ball bearing is also used to locate the shaft axially.

The bearings are constructed from a super-tough stainless steel, which features high amounts of nitrogen for superior fatigue and corrosion resistance. NoWear coated stainless steel rolling elements and a specially-designed cage also contribute to the solution's robustness and reliability to accommodate a wide range of loads and speeds.

Additionally, this special arrangement can be augmented with bearing design upgrades to meet specific application demands. These include SKF hybrid bearings with ceramic rolling elements to reduce inertial forces and heat. Special SKF cage designs offer further resistance to corrosive environments and SKF NoWear coated rolling elements can help reduce friction, while SKF INSOCOAT offers protection from electric currents.

Another product to have seen successful service in offshore applications is from SKF Group Company S2M, which has won a two-year contract to supply SKF magnetic bearings and associated electronics for subsea compression trains used in the Åsgard gas field in the Norwegian Sea. The SKF magnetic bearings will be fitted on the motor compressor shaft systems on the compressor units that maintain gas flow pressure level. These innovative bearings are an oil-free, frictionless and virtually maintenance-free alternative to mechanical bearings that provide optimum efficiency, reliability and performance vital for smooth operation in deep sea operations.

The magnetic bearings,will provide a high performance alternative to conventional mechanical bearing technology. The Åsgard gas field project will involve placing two hermetically sealed compressor units installed at a depth of between 200 and 300 metres on the seabed. The units function by maintaining discharge pressure in the pipeline and compensate for the falling suction pressure as the gas field is depleted, thereby boosting gas flow.

Used in highly specialised applications and industries such as offshore, these bearings can operate at high speeds, require no lubrication and, as there is no component wear, provide virtually maintenance-free long life. In a magnetic bearing system the rotating drive shaft is supported and held in position by electromagnetic forces generated in radial and axial directions. These forces are generated and controlled by sophisticated electronics and copper-wired electromagnets to provide contactless, wear-free operation.

Another intriguing solution to the stresses of offshore applications has been seen in the development of advanced elastomeric spring bearings for the oil and gas industry by Trelleborg Offshore. One application of such a bearing recently used the expertise gained in the oil and gas market to improve the stability of the 90-monopole wind turbine foundations at the Sheringham Shoal Wind Farm. In this instance, the gap between the inner foundation pipe and outer transition piece of the wind turbine is filled with cement grouting, which must withstand the vertical weight of the tower and the lateral wind loading forces. Following reports of grout failure on various wind farm projects, DNV, the certifying authority for the Sheringham Shoal project, radically reduced the acceptable loads on the grouted connections.

However, the Trelleborg Offshore bearings enabled the project owners to significantly reduce the load on the grouted connection and keep the project on schedule. Each wind turbine foundation comprises a 50m long, 5m diameter steel monopile pipe, which is piled 30m into the seabed. Below water level, a larger diameter transition piece pipe is fitted over the foundation for 7-8m and extends above water to a flange to attach the wind turbine tower.

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www.trelleborg.com

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READER INTERVIEW

IAN PEVERILL, BUSINESS TEAM MANAGER, RACING UNIT, SKF (U.K.) LIMITED

Q How did you get into engineering?

A On finishing school I managed to secure a mechanical engineering apprenticeship at SKF. This was a four year programme exposing me to various engineering roles within SKF. It also included day release to a local university allowing me to obtain a mechanical engineering degree. After four years of training in various SKF departments I became an application engineer providing technical support to a wide range of customers. Twenty years after leaving school and starting with SKF, I'm still here.

Q What does your job involve on a day to day basis?

A I am responsible for managing a small team of engineers supplying bearings and components to Formula One teams, other race series and niche sports car manufacturers. We are a relatively small unit within SKF overseeing everything from the design of the products, commercial aspects, quality and after sales technical support. We liaise with various SKF factories worldwide that manufacture these products.

Q What is the biggest design driver you see in your industry?

A With Formula One there is a need to be more environmentally friendly and relevant to road cars. The sport also needs to be sustainable so there is a focus on cost control. Outside of Formula One we are seeing other race series and niche sports car manufacturers needing to reduce CO_2 emissions. Innovation is the key to achieving these but we also have to focus on our cost.

Q How do you see the industry changing going forward?

A Reduction of CO_2 is the biggest challenge facing the automotive industry and we don't see this changing in the coming years. Formula One needs to be more relevant to the development of road cars and we expect to see increased focus on hybrid technology development and electric systems.

Q What interesting projects and technologies have you worked on?

A Each year the majority of powertrain, wheel and suspension components within a Formula One car are redesigned. We are therefore constantly involved with new technologies and innovations. The racing industry is also a valuable test bed for emerging SKF technologies. We use this to drive internal SKF product development; this could be new materials, new manufacturing techniques, or innovative designs. Outside of racing we are working on niche sports cars that are in a preproduction development phase.

Q What are the new technologies that you are excited about and see as being quite revolutionary to the wider world?

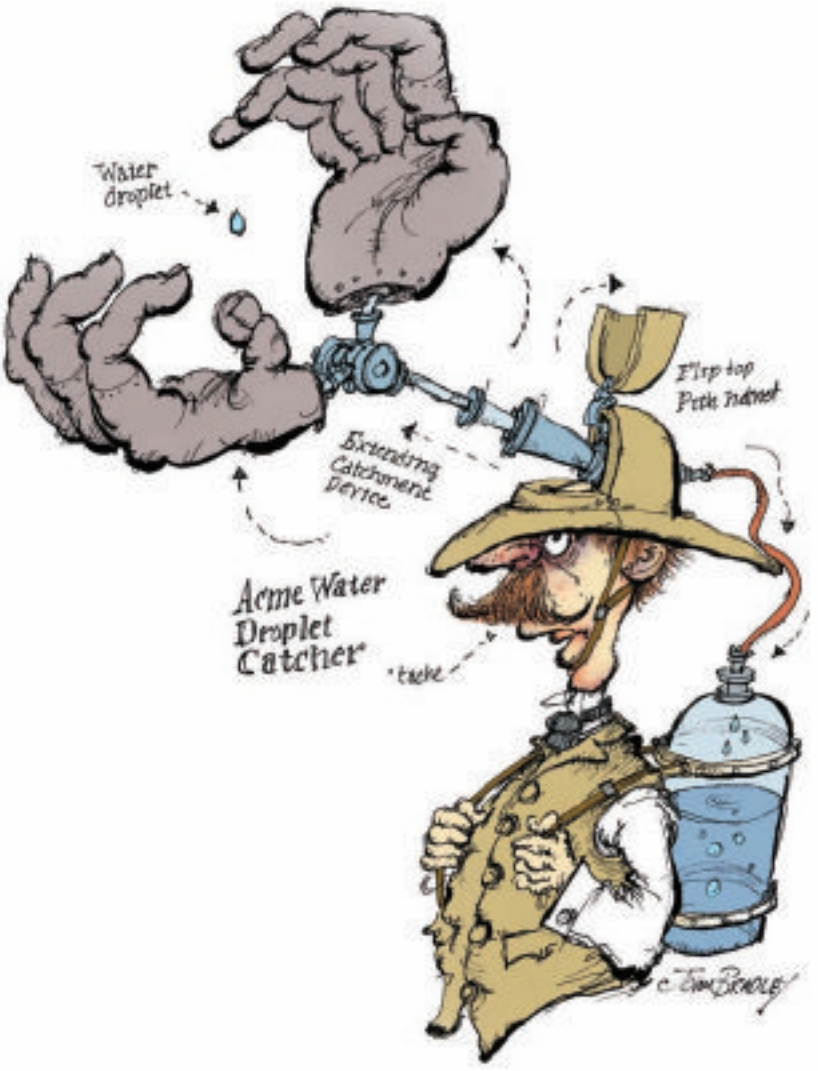
A Within racing we are working on bearings for kinetic energy recovery systems (KERS), turbochargers and hybrid powertrains. There will also be a complete new powertrain for Formula One cars in 2014, where we expect some of the technologies and innovations to be adopted by the automotive industry.

Q Advice to younger engineers just entering the industry?

A Don't always be rigid in what career path you want to follow within engineering. In your early career try and experience as many different roles as you can. This will build your experience and allow you to specialise in your career later. Stay in a role long enough to achieve something, but not too long that you stop learning and miss new experiences. Don't be afraid to question things and make mistakes; it's how you learn.

Thirsty work

Collecting and deploying water in drought-stricken regions is vital, but far from easy…



By 2025, the United Nations forecasts that 1.8 billion people will be living in countries or regions with water scarcity and two thirds of the world's population could be under conditions of water stress.

Climate change is expected to aggravate water problems via more extreme weather events. For this reason, there is currently a rush to arrive at any intelligent and improved management options to overcome these challenges.

The need to retain water in the most apparently dry conditions is therefore paramount. Even the driest air contains water molecules which can be extracted by lowering the air's temperature to the point of condensation. The only question is 'how'?

The Challenge

The challenge this month is therefore to come up with a means of collecting the water molecules in the air and harnessing them in such a way that they can be used to irrigate water-starved areas.

The solution is obviously based on the collection of condensation. After all, collecting condensation on a plastic groundsheet has long been standard practice among survival experts in even the driest conditions, but such a method is far from efficient and where water is scarce, efficiency is everything.

And, of course, collecting this water is only the first step. The real difficulty arises in working out how to collect this water and use it to irrigate land.

Clearly, the greatest problem with any storage system will be in preventing the water from evaporating when exposed to the desert sun. And, once that problem is overcome, how does one distribute it in such a way that ensures it is not wasted?

A solution to this problem has been developed that uses biomimicry to achieve excellent results. Indeed, trials have been carried out that have shown that the invention can return 10% of lost water and lead to cuts in energy bills for nearby buildings by reducing a city's heat sink effect.

But none of that means that you can't do better, of course. The solution will be revealed in our February issue, but in the meantime, see if you can improve on it.

The answer to last month's Coffee Time Challenge of an improved way to monitor the heartbeats of patents in hospitals can be found in the Technology Briefs section on page 8.

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Compression Limiters

New Guide to Spirol Compression Limiters

Spirol Compression Limiters are ideal components to meet the specific engineering and cost objectives for manufacturers of plastic assemblies. The company's standard range of Compression Limiters will meet most requirements, but special diameter, length, duty, material, tolerance configurations can also be supplied. The company's new Compression Limiter Design Guide provides details of all the product options available, design considerations and information on the support services available from Spirol Industries. Compression Limiters are designed to protect the plastic components of an assembly from the compressive loads generated by the tightening of bolts and will ensure the continued integrity of the bolted connection. As the bolt is tightened the plastic compresses and the stress in the plastic increases until the head of the bolt comes into contact with the Compression Limiter. The Compression Limiter and plastic will compress at the same rate with the Limiter absorbing additional clamping loads, without increased stress in the plastic material.

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Design and Development Engineer

Location: Swindon, Wiltshire
Type: Permanent
Salary: Negotiable

Job details: This company is looking for an enthusiastic, innovative and analytical degree qualified Electronics Engineer to join a small engineering team. With a good honours degree, you will be interested in pursuing a career in the technical aspects of power conditioning, motor drives and controls, rotating machinery and air moving products covering a power range from approximately 10W to 1kW. You will be engaged in all disciplines relating to the development of new products and systems, supporting electromechanical design activities, hands-on testing, reporting and customer liaison.

Capable of operating within a dynamic team working environment, your bright and flexible approach will require good written and oral communication skills, professional responsibility for your own contributions and clear presentation of engineered solutions, since you will be contributing to major development projects and liaising with third party agencies to gain product approvals from the outset.

For full details online enter reference: JS-Torin

Product Engineer/ Mechanical Engineer/Pro-E Software Engineer

Location: London
Type: Contract
Salary: £200 per day

This company seeks a product engineer/ mechanical engineer/Pro-E software engineer (injection moulding) to join its established and rapidly developing design consultancy. You will have the opportunity to use your impressive product development experience in the design and development of truly unique products for one of the UK`s most exciting companies.

You will be proficient in the following:

- Pro-E software - sufficiently competent to be able to take ownership of a moulding and its relationship to other mouldings whilst working as a team of say 3 to achieve a fast turnaround
- Surfacing, as well as moulding/product engineering experience
- Knowledge of injection moulding principles – draft angles, up & aways, shut-offs and side actions

For full details online enter reference: JSTPPE

Mechanical Design Engineer

Location: Edinburgh
Type: Permanent
Salary: Negotiable

Shore Design has an immediate position for experienced and creative product design/mechanical engineers to join our successful team in Edinburgh.

Applicants should be qualified to degree level in a relevant discipline and have a minimum of 3 years' industry experience in a suitable engineering discipline, ideally from a consultancy background. The ability to develop engineering solutions from first principles and a working knowledge of Pro/Engineer Wildfire is essential.

You will be equally comfortable working alone with minimum supervision or as part of a wider project team and at all times bring your own powerful creative input into the collaborative mix, always pushing the boundaries with fresh ideas and technical solutions.

Primary role: To provide professional mechanical engineering expertise for our customers who range from large, well known, multi-national companies to small start up organisations.

For full details online enter reference: JSDEC11/ME

Opto-Mechanical Engineer

Location: Sunderland, Tyne & Wear
Type: Permanent
Salary/Rate: Up to £30k per annum

Job Details: Exciting growth opportunity for a highly motivated Opto-Mechanical Engineer or a PhD researcher with a mechanical and optical background to work for a small business within the field of medical imaging systems.

The work will involve the design of complex opto-mechanical hardware in the field of laser scanning microscopy. Applicants should be confident in all the practical aspects of opto-mechanical systems and have the experience necessary to assist in taking a design all the way from initial concept, through simulation and prototyping into production.

Essential Skills: The candidate should have formal qualification in an appropriate discipline and be able to demonstrate sound understanding of opto-mechanical principles, including: materials choice vs. cost and tolerance, injection moulding/die castings, geometric tolerancing; experienced in SolidWorks CAD ; conceptual design layout, package prototyping, fixture/tooling design, development of mechanical attachment methods/tools for optimal optical alignment, etc.

For full detailfs online enter reference: JSFP1343

FEA Engineer/ CAE Engineer

Location: Northampton,
Type: Contract
Salary: £30-35k per hour

The opportunity has arisen to join an industry leader in the design, development, and production of interior seating for on and off road vehicles, as a contract FEA Engineer. You will be joining a company supplying a vast number of leading OEMs and have the opportunity to work closely with global customers and colleagues. You will be working within a company focused upon innovation and forward thinking.

The role: The FEA Engineer will work in the Advanced Engineering team and will lead FEA activities for the development of seating systems. You will take up the primary role in activities such as structural analysis, NVH analysis, crash prediction, and occupant simulation, using LS-Dyna and Abaqus. You will also drive continuous improvement of processes and methodologies, and have the opportunity to utilise their experience to make a profound difference to Computer Aided Engineering within the company.

For full details online enter reference: JS-51637-ENGIN-TAB

Senior Mechanical Design Engineer

Location: Farnham, Surrey
Type:Permanent
Salary: £35k-£43k per annum + benefits

Innovative technology company, developing advanced motor drive systems for hybrid electric vehicles, is looking to recruit an experienced mechanical design engineer with strong design and analysis skills to support their product development activities. The mechanical engineer will be involved in the full development lifecycle, from initial specification & analysis, through detailed design, optimisation and prototype testing.

You will be an experienced mechanical design engineer and, while it would be useful to have automotive industry knowledge, the key skills this client is seeking are strong design and analysis, which includes the use of 3D design tools (it uses Solidworks) and Finite Element Analysis (FEA) techniques for stress, CFD, thermal analysis, etc. Electro-mechanical systems, power transmission, engine systems or electrical machine design would be of particular interest.

For full details online enter reference: JS-11-04798

Processor Division Project Manager

Location: Cambridge, Cambridgeshire
Type: Permanent
Salary: £50k per annum + benefits

The Project Manager works closely with the Product Manager, Technical Lead and engineering team, and manages engineering projects from conception through to final delivery to ensure quality, on-spec, on-time delivery of products. Responsibilities include driving and monitoring the project, planning, scheduling, issue/risk management, as well as management of project stakeholders, and dependencies and communication to external partners.

The role will involve managing multiple engineering projects, which may include processor designs or system components. There will be close links with teams in the UK, US, Europe and India, requiring regular communication and occasional travel.

Desirable skills & experience: Formal project management qualification (eg, PMP); Familiar with project scheduling tools, such as Microsoft Project, etc.

For full details online
enter reference: JS-1110-6

Mechanical Design Engineer

Location: Cambridge, Cambridgeshire
Type: Permanent
Salary: £45k per annum + benefits

International electronics development and manufacturing firm is looking for a Mechanical Design Engineer to work as part of the printhead development team, with specific responsibility for mechanical and functional design. The role covers the entire lifecycle of the product, from initial concept through design, validation, field trials, release into production and maintenance.

The successful candidate will be completing design work, using 3D CAD and FEA techniques, working with particular focus on fluidic and thermal performance. Candidates should have experience of designing complex assemblies and have practical experience of designing for fluidic flow, thermal, shock and vibration considerations.

Essential experience: degree in Mechanical Engineering or equivalent; good grounding in applied mathematics, physics or chemistry; at least 5 years' experience on products of similar complexity, etc.

For full details online
enter reference: JS2401MDE

Chartered Mechanical Engineer

Location: West Midlands
Type: Permanent
Salary: Up to £50k per annum

Job details: Global leading client is seeking a Chartered Mechanical Engineer to add to its team. The Chartered Mechanical Engineer will have extensive experience, with a minimum of 5 years in mechanical design of electrical equipment.

The successful candidate will have the following technical skills:

- Basic grounding in classical stress analysis
- A strong user of 3D CAD software (ideally ProEngineer)
- General knowledge of overall HVDC/SVC.

For full details online
enter reference: JS-J5098

Mechanical Design Engineer (Defence)

Location: South West
Type: Permanent
Salary: £35k-£45k per annum plus benefits

A leader in the defence industry is looking to recruit a Mechanical Design Engineer to undertake mechanical engineering tasks within multi-disciplined project teams for the installation design of platform subsystems. The role will take a holistic approach to mechanical engineering, taking into account factors such as safety, cost, ease of manufacture and through-life support.

As the Mechanical Design Engineer, you'll be responsible for the mechanical design solutions within the Electronic Architecture Team, including Concepting, Packaging and Platform Installation design.

You'll ideally be educated to degree/equivalent level in a mechanical design discipline, and have an applied working knowledge of 3D CAD packages and BoM structures. You'll have full understanding of BS8888 design practices, and full understanding of mechanical standards for fabricating, machining and finishing. You'll have electrical subsystem packaging and platform installation experience, and have the ability to interpret mechanical design requirements and propose design solutions.

For full details online enter reference: JS-BBBH32596

Mechanical Automotive Test Engineer

Location: Northampton, Northamptonshire
Type: Permanent
Salary/Rate: £30k-£35k per annum + benefits

This company, based in Northampton, has an opportunity for a Mechanical Automotive Test Engineer to support the Test Department in strength, durability, performance, and characteristic testing of vehicles as part of the product development process.

Major Responsibilities include: Evolve and maintain timing plans for test activities - rig and vehicle testing; aid in design of test rigs with a future progression to designing rigs independently; set up test controllers and monitor rig tests, maintain detailed test logs on a range of prototype suspension components and assemblies; carry out instrumentation on rigs and vehicles for data collection; carry out detailed analysis of acquired data for fatigue, performance and reliability, etc.

Qualifications: Bachelors/Masters Degree in mechanical/automotive engineering or equivalent; 3+ years demonstrable experience within a structural test function; good working background and understanding of vehicle dynamics and ride concepts; theoretical or working knowledge of metal fatigue, etc.

For full details online enter reference: JSDE13835

SolidWorks Mechanical Design Engineer

Location: Slough, Berkshire
Type: Contract
Salary: £20-£24 per hour

Job Details:
Excellent opportunity for a mechanical design engineer/design draughtsman to join this company on a 6-month contract basis.

Beneficial knowledge, skills and abilities:

- Good drafting and detailing knowledge
- Experience of AutoCAD design software
- Experience of SolidWorks 3D design software
- Knowledge of fits and tolerance
- Knowledge of components such as gear-boxes, bearings, shafting etc
- Welding experience
- Knowledge of rotating equipment including mixers, screw conveyors, rotary drums
- Experience of welded fabrications.

If you have good SolidWorks' ability and can start a new contract in the next 2 weeks, please do apply.

For full details online enter reference: JSDE13954

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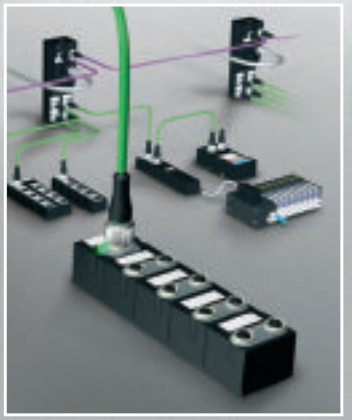

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