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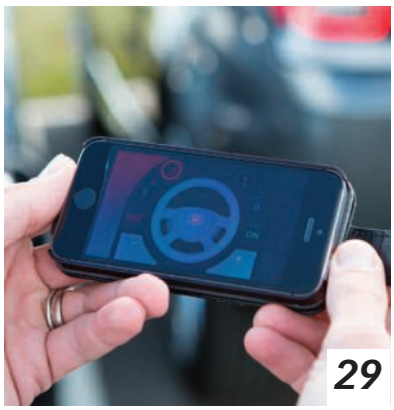

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Taking stock of China

Tim Fryer, Editor (tfryer@findlay.co.uk)

The concept of a global recession has always eluded me. As long as we have the raw materials for civilisation, like food and fuel, then a global recession seems to be counter-intuitive – do we as a planet owe another planet a huge amount of galactic dollars? Assuming we don't then global recessions must be a fabricated condition that presumably the majority of the seven billion inhabitants of the world do rather badly out of, while a handful are profiting quite happily. Presumably if everyone was doing badly then we could find a way of cross-cancelling debts to everyone's advantage.

There has been a theory that the UK has put itself in a vulnerable position over recent decades by whittling down its manufacturing and engineering sectors. An economic crisis exposes our reliance on service industries and we look enviously at Germany whose engineers appear to give the country a foundation that lessens the depth of recession and speeds recovery. The debate continues about what we have done and need to do in terms of technology and training to get us back on the road to self-sufficiency.

Incidentally I am not saying we are in a global recession, but there is certainly global caution, and more significant consequences were being mooted as the Chinese stock exchange wobbled and collapsed. And it is China that is the interesting point here. The world's second largest economy has also become the world's factory. While it has millions involved in manufacturing it is now also ramping up its ranks of qualified engineers, signalling intent at least to add high value engineering to high volume manufacturing.

It doesn't, however, seem to have stopped the Chinese stock market falling off a cliff, so maybe having such an industrial base isn't so critical. More likely the quest for quick profits in the financial sector has overheated once more and this is just one of those periodic adjustments. Sadly such adjustments can cost jobs – proper engineering jobs – whatever the country. But perhaps, without wanting to trample on others' misfortune, this lack of economic stability in the Far East could be another reason (and there are already plenty) why engineering design and manufacture work best together on home soil.

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NEWS

3D printed robotic hand wins Dyson Award

Joel Gibbard, winner of the Young Engineer of the Year at last year's British Engineering Excellence Awards, has won the James Dyson Award for his 3D printed hand. Gibbard claims the hand can be made faster and at lower cost than current artificial limbs.

The prosthetic, designed by Gibbard's Open Bionics project, can be produced in 40 hours and is available at a price of £2000, including the cost of fitting. Though his design isn't as advanced as some alternative prosthetics which can cost between £30,000 and £60,000, it is a much more affordable option, especially for children who may have to change their prosthetic multiple times a year to compensate for their growth.

"I'm a great believer in finding more efficient ways of doing things. By embracing rapid prototyping techniques, Joel has initiated a step-change in the development of robotic limbs," said James Dyson. "Open Bionics opens doors to a community that might not have previously had access to advanced prosthetics."

Engineering music

Schoolchildren in Bristol will be given the chance to design and build their own digital musical instruments, thanks to a three year partnership between Bristol Music Trust and Renishaw.

Sir David McMurtry, chairman and chief executive of Renishaw, said: "This programme is an opportunity for young children to gain a crucial understanding about different engineering skills and how they can combine in a creative way."

To build their own digital musical instruments, pupils will be introduced to simple explanations of electrical circuits, building musical instruments with the Arduino-based Makey Makey boards and performing music in groups.

Batteries, switches, LEDS, LDRs, diodes, transistors, buttons and potentiometers will combine to form linear circuits drawn entirely on paper. Pupils will then create circuits with their own design using conductive ink. Flows of electricity will trigger music making devices, for example a Raspberry Pi, to trigger notes, and hand-drawn electronic synthesisers will play songs.

Events

For more event details go to www.eurekamagazine.co.uk

29 September
Launchpad Competition Final
London
Finalists' pitches from young technology entrepreneurs

29 September - 1 October
PPMA Show 2015
NEC, Birmingham
Exhibition

30 September - 1 October
Sensors & Instrumentation
NEC, Birmingham
Exhibition

30 September - 1 October
TCT Show + Personalize
NEC, Birmingham
Event dedicated to additive manufacturing

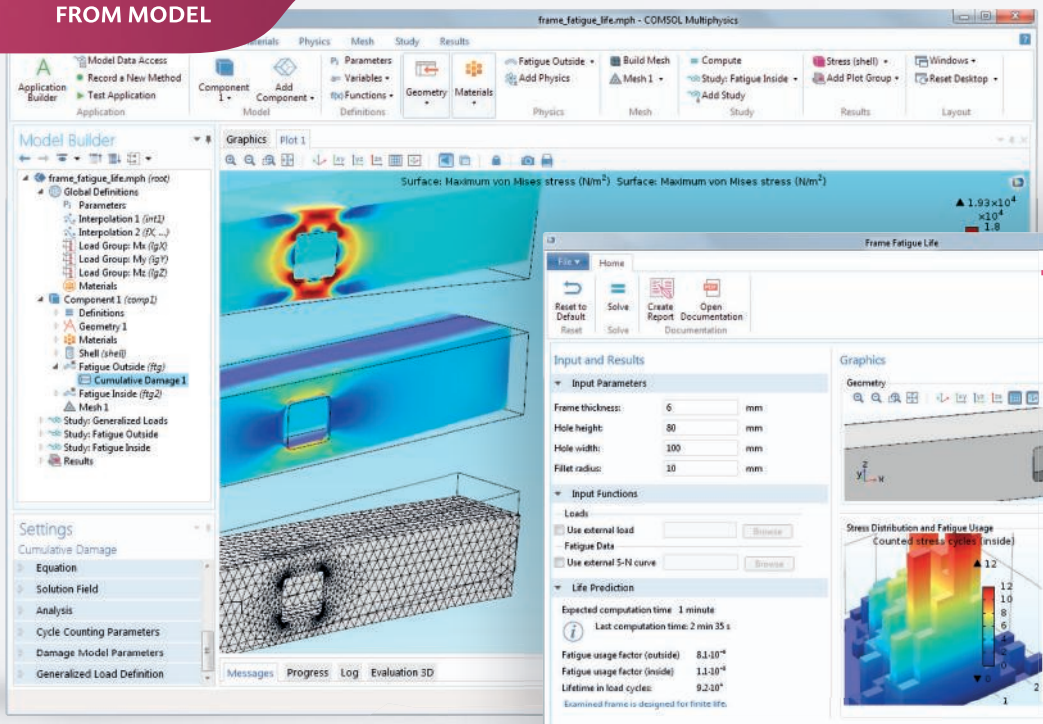
21 - 22 October
Engineering Design Show 2015
Ricoh Arena, Coventry
Conference, workshops and exhibition – see full preview starting on page 39

29 October
British Engineering Excellence Awards (BEEAs)
The Hurlingham Club, London
Awards ceremony celebrating engineering excellence

3 November
NIDays - London
QEII Conference Centre, London
Graphical system design technical conference and exhibition

4 - 5 November
Advanced Engineering UK
NEC, Birmingham
Advanced engineering trade show and conference

FROM MODEL



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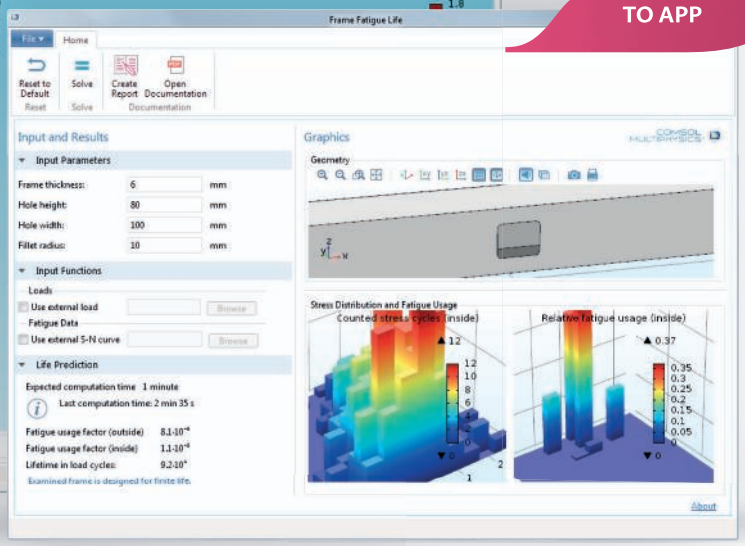

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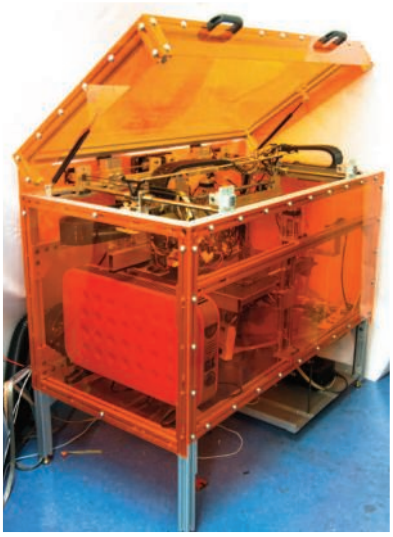

MultiFab 3D prints a record 10 materials at once

Researchers at MIT's Computer Science and Artificial Intelligence Laboratory (CSAIL) say that they have developed a 3D printer that can print an unprecedented 10 different materials at once by using 3D-scanning techniques that save time, energy and money.

Delivering resolution at 40µm, the 'MultiFab' system is the first 3D printer to use 3D-scanning techniques from machine vision, which is said to offer two key advantages in accuracy and convenience over traditional 3D printing.

First, MultiFab can self-calibrate and self-correct, freeing users from having to do the fine-tuning themselves. For each layer of the design, the system scans and detects errors and then generates so-called 'correction masks'. This approach is claimed to allow the use of inexpensive hardware while ensuring print accuracy.

Secondly, MultiFab gives users the ability to embed complex components, such as circuits and sensors, directly onto the body of an object, meaning that it can produce a finished product, moving parts and all, simultaneously.

Funding to aid discovery of new advanced materials

A £6.65million grant for research aimed at accelerating the discovery and application of new advanced materials for the energy sector has been announced by the Engineering and Physical Sciences Research Council (EPSRC).

The grant, awarded to a team led by Professor Matthew Rosseinsky (pictured) of the University of Liverpool, will support the programme; Integration of Computation and Experiment for Accelerated Materials Discovery.

Prof Rosseinsky will head up a team at Liverpool and University College London that will work to tackle the challenge of designing and testing new materials at the atomic level and aims to keep the UK ahead in the global materials competition.

"With the approaches we will develop, we aim to address problems such as how to create materials for sustainable energy production and storage such as safer new battery technologies or the efficient capture and utilisation of solar energy," Prof Rosseinsky said. "We will combine computation and experiment to discover new materials, developing methods that combine calculation with chemical understanding."

£20m fund to develop lightweight vehicles

Innovate UK and the Office for Low Emission Vehicles (OLEV) are to invest up to £20million in collaborative research and development projects to significantly reduce the weight of road-going vehicles.

It aims to develop the supply chain and expertise in the areas of advanced lightweight materials to make the necessary steps in road vehicle weight reduction in order to reduce CO_2 and other emissions.

Proposals must be collaborative and led by UK-based business organisations. Small businesses could receive up to 70% of their eligible costs, medium-sized businesses 60% and large businesses 50%. Projects are expected to range in size from £2m to £5m, and to last between 18 and 36 months. The deadline for registration is noon on 7 October 2015, and the deadline for applications is at noon on 14 October 2015.

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Solution to last month's Coffee Time Challenge

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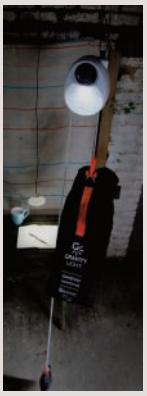

Last month our challenge was to find a cheap, reliable and safe way of providing light to homes that have no electricity and rely on dangerous and expensive Kerosene lamps. Our solution is provided by GravityLight, the name describing the basic principle. Gravity transfers potential energy to kinetic, which produces electricity to light an LED.

GravityLight is installed to provide a 1.8m drop of a 12kg weight. This weight is lifted and on release starts falling very slowly (about 1mm / second). This movement powers a drive sprocket, which rotates very slowly with high torque. A polymer geartrain running through the product turns this input into a high speed, low torque output that drives a DC generator at thousands of rotations per minute. This generates just under a tenth of a watt, a deciwatt, to power an onboard LED and ancillary devices. Given the ever-increasing efficiency of LEDs, this produces a light over five times brighter than a typical open-wick kerosene lamp. Once the weighted bag reaches the floor, which depends on how high it was installed, it is simply lifted to repeat the process.

GravityLight has been through trials with its first generation model and intends to start mass production with the second generation model in the autumn 2015. For more information **visit www.gravitylight.org**

Smooth mover

Researchers at Sweden's Chalmers University of Technology claim to have reduced the energy consumption of an industrial robot by up to 40%. The team optimised an algorithm to minimise the robot's acceleration while retaining its production time.

Optimisation of the robot's movements reduces acceleration and deceleration, as well as the time the robot is at a standstill since being at a standstill also consumes energy.

The optimisation programme starts by logging the movements of each robot during an operations cycle, as well as any collision zones. This information is processed by the optimiser, which generates new control instructions that can be directly executed by the robots.

"The first test results have shown a significant improvement, such as a 15 to 40% energy reduction, but the results are still preliminary. In order to estimate the actual energy savings, further testing in industry is required", said Kristofer Bengtsson, who is responsible for the implementation of the optimisation strategy.

Here is a selection of the latest products featured on the Eureka website. Just enter the reference code in the search box for the full story

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88493

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88516

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88492

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88523

Canon enters 3D machine vision market
88058

Lightweight connectors for harsh environments
88082

TECH BRIEF

Faster code in 2015

National Instruments (NI) has released LabVIEW 2015 system design software. The latest version of LabVIEW is claimed to deliver speed improvements, development shortcuts, and debugging tools. LabVIEW 2015 allows designers to reuse of the same code and engineering processes across systems, saving time and money.

The software is also said to reduce the learning curve for employing a software-designed approach to create powerful, flexible, and reliable systems. With three application-specific suites that include a year of unlimited training and certification benefits, developers have access to software and training resources to build better systems faster.

LabVIEW 2015 is extended by the LabVIEW Tools Network, which includes IP both from NI and third-party providers. The Advanced Plotting Toolkit by Heliosphere Research is said to furnish developers with powerful programmatic plotting tools to create professional data visualisations. The RTI DDS Toolkit by Real-Time Innovations is said to enable IoT applications with scalable peer-to-peer data communication. Additionally, application-specific libraries for biomedical, GPU analysis, and Multicore Analysis and Sparse Matrix applications are now available free of charge.

NEWS

12 mile high inflatable space elevator

Thoth Technology has been granted the US patent for a 12 mile high space elevator. The freestanding space tower would be pneumatically pressurised and actively-guided over its base. It would stand more than 20 times higher than the current tallest structures and would also be used for wind-energy generation, communications and tourism.

According to the patent, the length of the tower would be made of a flexible sheet material divided into a 'plurality' of sections, each section would contain a separate core and stabilisation devices using gyroscopic or active control machinery to control pressurisation in each of the segments to keep the structure standing.

Traditionally, regions above 31 miles in altitude can only be reached by rocket ships, where mass is expelled at a high velocity to achieve thrust in the opposite direction. Dr. Brendan Quine, the space elevator's inventor, said that a space elevator would save more than 30% of the fuel of a conventional rocket.

"Astronauts would ascend 12 miles by electrical elevator. From the top of the tower, space planes will launch in a single stage to orbit, returning to the top of the tower for refuelling and reflight," said Dr Quine.

3D printing with molten glass

Researchers at the Massachusetts Institute of Technology (MIT) have unveiled a new additive manufacturing technique that prints molten glass at high temperatures, layering it to produce 3D printed glass objects able to transmit light. The technique is essentially a mixture of conventional glass making with a digitally controlled nozzle that layers glass according to designs drawn up in a 3D CAD programme. This process makes it possible to tailor the size, shape, and properties of the printed glass parts. The trick is bringing all the various components together so that the 3D printer can handle the extremely high temperatures required. The Kiln Cartridge above the printer nozzle operates at approximately 1037°C.

TECH BRIEF

Small motors pack big features into limited spaces

Motion Control Products has introduced what it claims is the smallest Lexium MDrive integrated motor, a 42mm NEMA size 17 stepper motor with built-in electronics, delivering a large range of features to small spaces.

Industrial M12 connectors provide Lexium MDrive products with a robust interface, and IP65 certification protects against water and dust in harsher environments. Compact in size, these products are said to outperform many larger motors, delivering up to 2x the motor torque with hMT closed loop technology.

Engineering

There is no doubt about it, designing a rollercoaster is something we'd all like to have a go at. But be warned, this is a complex problem that needs the assistance of modern analytical tools to get thrill seekers coming back for more. Justin Cunningham reports.

We all remember a good rollercoaster. The speed, bumps, twists and turns create a powerful feeling of elation, which leaves most with a smile on their face and willingness to go again. This is the hope at least for those whose day job it is to design and engineer rollercoasters.

It is a small club indeed with relatively few companies and engineers actively involved in the design of rides around the world. It's surprising, especially considering that last year there were nearly as many rollercoaster passengers as global airline passengers: an estimated 1 billion people threw their hands up, screaming aloud, to enjoy that big first drop on the track.

"It is very difficult to enter into this field," said Marco Begotti, CEO of Ride Tex Engineering, an Italian based rollercoaster design consultancy. "But, it is also very difficult to exit from it too. There are probably 20 engineers in Europe that do this job, and only a few companies around the world."

It's definitely a cool job and one that every engineer's inner 12 year old would certainly approve of. But behind these initial impressions lies a complex design and engineering challenge, which is tightly regulated.

Sensation innovation

The centrepiece of any rollercoaster remains its slopes and what thrill seekers call 'airtime', the negative G-force experienced when the train reaches the top of hills, giving that feeling in the stomach that many have come to love. But a wave of innovation has swept across rollercoaster developments in recent years, as design engineers look to answer the calls of those brave enough to build increasingly thrilling rides. Faster, higher, more loops, various 'seating' positions – from being stood up to laying flat like superman – and even cars that rotate independently of the track... It means there are more options than ever, and more calculations, to get the best ride and sensation for those eagerly queuing to have a go.

The starting point for a rollercoaster is often the footprint within which it is to be built. As theme parks look to replace rides, an idea of the space becomes available. Next, it is usually market forces that drive what the rollercoaster might be. For example, the park might want to attract more families, so the ride will not necessarily aim to scare

thrills

One step beyond?

It's not about reinventing the rollercoaster per se, it's about reinventing the seat. This revolutionary design from US based Coaster Labs, will make riders feel as if they've just been ejected from their seat mid-ride. The coaster appears as a normal train, however, at some point in the track (probably during 'airtime' – where negative G is experienced – an 'Ejector Seat' will push riders up in to the air, by up to a metre. The riders' feet will come completely off the floor and they'll feel like they've been fired off into the sky.

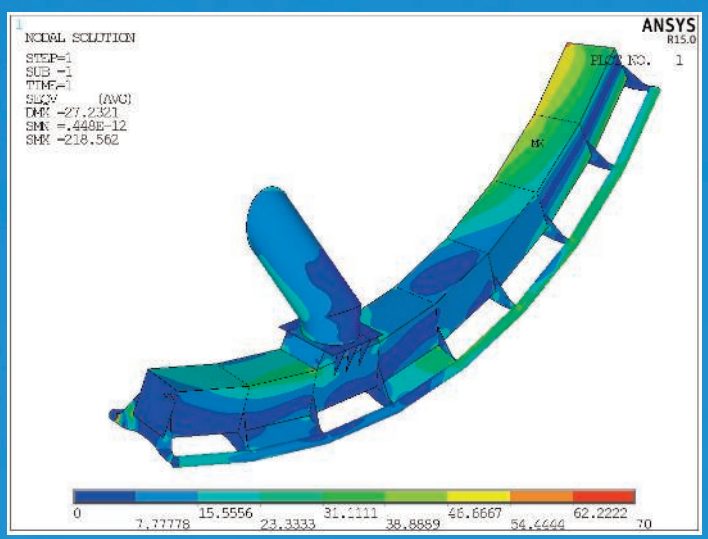
coaster-lab.com

passengers – at least not quite so much.

However, if the theme park is looking to attract more teenagers then it may well be something that stands out as a bit more wild to give passengers their much desired 'airtime' hit.

"The design driver is to attract the most number of people to the park," said Begotti. "If you think it is most important to catch families, you must improve those rides. If you have competitors around the area and want to do something really different, then you can create a new rollercoaster that is higher and faster. It isn't so much what the people want, but what is the best ride for this total environment."

Ride Tek has had tremendous success in delivering various rollercoaster's to theme parks around the world. To date Begotti has designed more than 50, with countless ideas and patents to his name.



Tenders can arrive to Ride Tek with little more than, what to many, looks like a squiggle. This represents the layout of the track – often and unsurprisingly produced by a layman. The theme of the ride follows. This can be based, for example, on a film franchise or put together as standalone theme like Oblivion in Alton Towers, which introduces the 'experience' as customers queue.

It is then up to Ride Tek to deliver a rollercoaster that satisfies both the design theme and a compelling track that is engineered accordingly.

"Just having an idea is not enough," he said. "You need to work inside rules and human factors and such things. But, the initial idea is one of the beautiful parts of the design process as you feel like you are creating something. But it is a mix between idea, creation and engineering that makes a good rollercoaster."

Innovative rides are now commonplace in theme parks around the world. From vertical drops to coasters that replicate the speed and acceleration of an F1 car. The limits of what is possible are being explored more than ever before - so how have engineers been able to do it?

You might think that turning a conceptual idea into a workable and deliverable rollercoaster design would be a drawn-out process, but it is as frighteningly quick as the coasters themselves (well – nearly),

Alton Towers crash

UK theme parks came under intense scrutiny in June following a crash at Staffs-based Alton Towers. A carriage on the Smiler rollercoaster collided with a stationary car that resulted in 16 injuries, four of which were serious. Eighteen year old Leah Washington lost her left leg in the accident.

While an investigation by the Health and Safety Executive is ongoing, it is rumoured by industry experts that human error is likely to blame. Such incidents are extremely rare, however it serves as a stark reminder of the criticality of safety control systems to stop such events from happening.

The next update to the European regulations on the design, manufacture and operation of rollercoasters is due by 2016 and is expected to increasingly focus on the design and maintenance of electronic safety control systems.

routinely taking three to four months to go from a rough sketch to delivery of all the engineering drawings to the manufacturer.

Modern design tools have no doubt had a huge part to play, and for the past several years Ride Tek has been working with software company Enginsoft to integrate its 3D CAD modelling software with a multi-body simulation package. The aim has been to make the design process faster, more efficient, and allow more innovation. It works much like a plug-in and allows simulation to be carried out at the beginning of the ideas process, right up to the more detailed design phase.

"This software we've created is unique and is completely dedicated to our field," said Begotti. "When I'm in the design phase, I have all the information relating to the dynamics of the car and the people riding within it. I can understand immediately if there is a peak force on the head or neck, or any part of the body, and if something needs changing or optimising. So we can make changes and then recheck. When you arrive at the end of the process you know that 90% of the time the rollercoaster is done. It is optimised for the best acceleration and ride for passengers."

Like many other sectors, theme park rides are achieving faster times to market with bigger and better improvements. Relatively large jumps are being made between design iterations, which multi-body software providers say is due to their computational powers. And it may well be. One of the key things, particularly with regard to rollercoasters, is the number of iterations it allows to be analysed and assessed in a relatively short period of time.

"In the same time it would have taken 10 years ago to make one track, we can propose three or four different tracks, with different kinds of cars, and simulate them all," said Begotti. "So the simulation process increases our ability to explore different ideas quickly."

And this is not only helping speed up the design and delivery of rollercoasters, but to push the physical boundaries as well. Yet, while there will always be room for improvement, many feel that some limits are close. With some coasters pulling a stomach churning 1.7G, reaching a top speed of 150mph and accelerating from 0-60mph in less than 2s (that's faster than any production available supercar), surely there is not much more the average body can take without risk of injury? Those designing coasters, including Begotti, still feel there are many areas left to exploit that will continue to leave passenger awestruck at the end.

Coaster commonality

One common attribute seen on rollercoasters around the world is the steel lattice structure that supports the track as it weaves through the air above. "These huge structural steel parts are impressive," said Begotti. "So using the multi-body simulation software we know a certain layout and wall thickness of the steel tubes will last – for example – the life of the rollercoaster, maybe 30 years."

This is all part of the work to digitally verify designs right from the conception of a project. Here, any potential design is made into a virtual rollercoaster prototype, which provides immediate feedback on the longitudinal, transverse and normal acceleration forces felt by passengers and on the car, as well as any corresponding structural loadings and stress build up in the steel structure as it rides along.

The complexity involved in multi-body and finite element analysis models can vary. In many cases beam and shell models are used to assess the stress and strain exerted on the cars and the steel structure on a particular layout. In other cases where more detailed analysis is required, finite element brick models can be developed.

"The numerical engineering simulation is fundamental for reliable consideration of the structures and components because life is at stake," explained Begotti.

Multi-body software provider Ansys highlighted the importance of using simulation within the design process as it allows realistic comparison to the real world. Gary Panes, European marketing director at Ansys, said: "The fact is, the products you design have to fit into the real world. They will all experience multi-physical forces... and have to survive them. If you over design you have higher material costs, higher cost to market, inflated fuel costs and you are not being competitive. If you under design then it's worse: product failures, warranty costs, legal ramifications, and negative public image."

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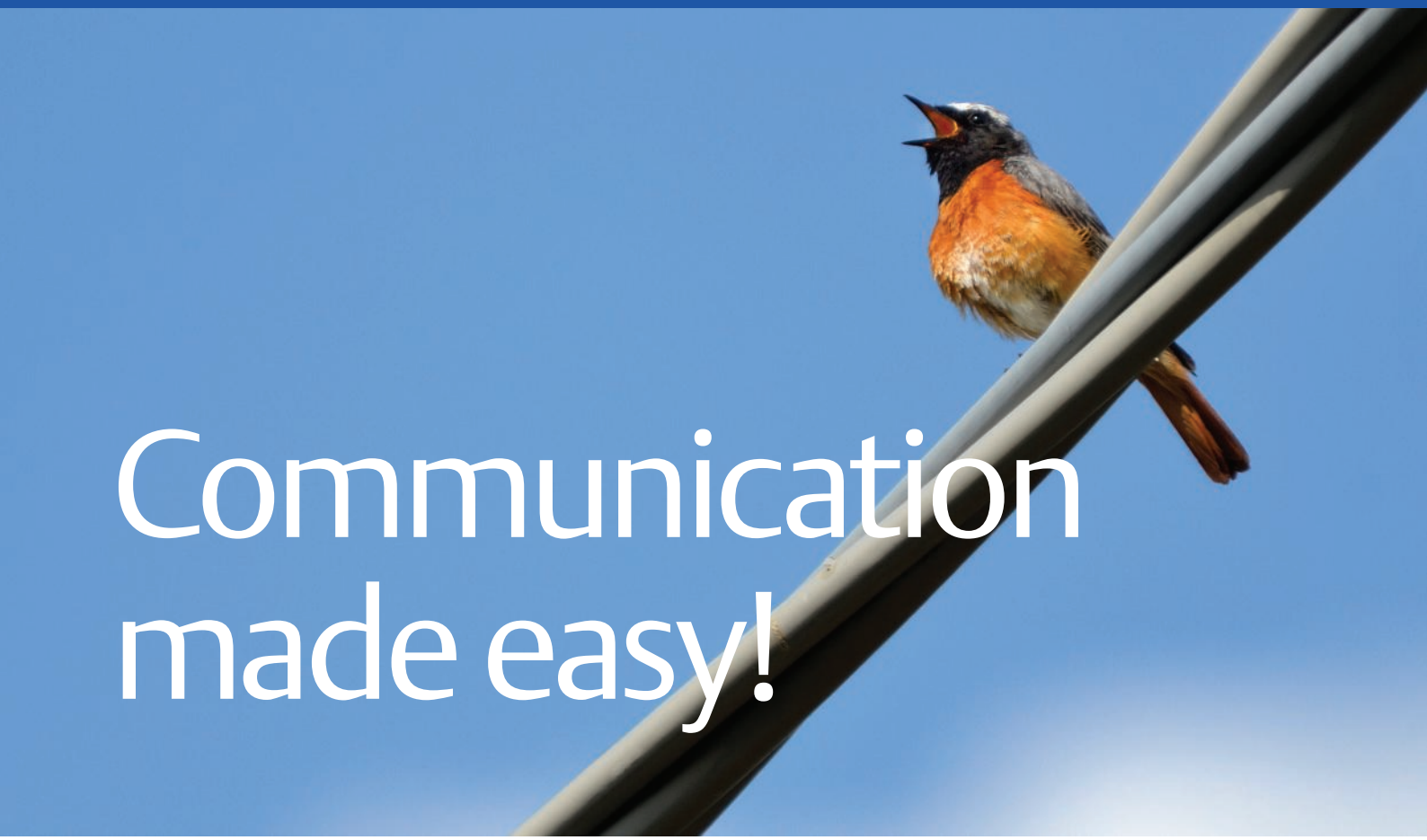

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Expert on the ball

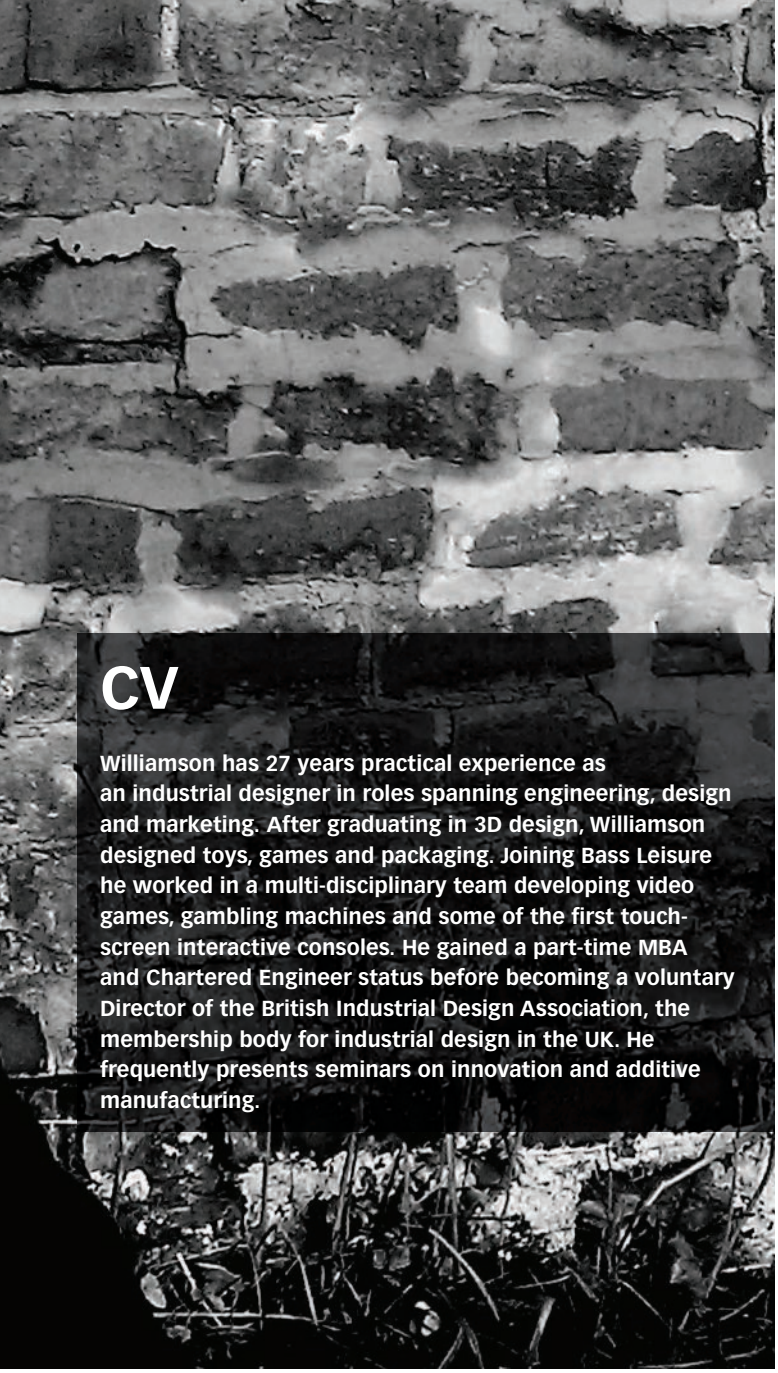
Industrial designers can sometimes get a bad press – too much style with not enough substance. On the whole this is ill-deserved according to Alistair Williamson, managing director of Lucid Innovation, but that is not to say there isn't room for progress, as he told Tim Fryer.

Throwing designs over the wall, from industrial designer to a waiting engineer who will turn those concepts into working solutions, is very much a thing of the past. "It would have been great, but in my 28 years experience there is very little throwing over the wall," said Williamson. "It might be passing the ball on occasion, but most of the time it's actually a case of if you've got the ball, you've got to keep it, and you've got to sort it out." Design and engineering continue to converge.

This is at the crux of where Williamson believes progress needs to be made - if that hypothetical ball is going to be kept, there needs to be a multi-skilled and empathetic design team to do the necessary juggling.

This empathy must exist between the engineers and the end users, whose needs, claimed Williamson, should be catered for upfront rather than being left behind as the engineers adopt their default position of 'making a dash for the technical solution.' What a good industrial designer can do is identify what people want and need, and then seek out the best technical solution, of which there might be many. "So I think a very broad approach at the start of projects is important," commented Williamson, "because otherwise you box yourself into a solution that perhaps is inappropriate for the market or for the need. Sometimes the solution might even be in software rather than hardware."

Good industrial designers are not ten a penny however and that is



CV

Williamson has 27 years practical experience as an industrial designer in roles spanning engineering, design and marketing. After graduating in 3D design, Williamson designed toys, games and packaging. Joining Bass Leisure he worked in a multi-disciplinary team developing video games, gambling machines and some of the first touch-screen interactive consoles. He gained a part-time MBA and Chartered Engineer status before becoming a voluntary Director of the British Industrial Design Association, the membership body for industrial design in the UK. He frequently presents seminars on innovation and additive manufacturing.

why Williamson believes there needs to be a change of approach from the industrial design community.

Firstly, there is an issue with the quality of further education. Quality and content of engineering courses at British universities tends, he argues, to be reasonably uniform and so the graduates they produce will be of a reliable standard from a wide range of institutions. This is not the case for industrial design. In a survey Williamson is conducting for the British Industrial Design Association (BIDA) asking respondents to name the top courses, two institutions completely dominated the choices. "This suggests that there's quite a lot left to be desired," admitted Williamson, "and some of the comments about the inconsistency in the level of graduates were very revealing."

Further training to create the multi-skilled engineer is also not straight-forward. Williamson said: "The Royal College of Art and Imperial College run postgrad qualifications primarily targeted at engineers to introduce them into more what you might call 'design thinking'. But there's very few examples that are successful the other way round for industrial designers."

So how has this situation come about and what can the industry itself do about it? Williamson believes progress is being made: "Perhaps it is because of the lack of involvement of effective trade associations or professional bodies in the past - it's the fault of industrial designers that that's happened. But I do think it is changing. About two years ago the IED started to do Chartered technological problem design status.

"That's starting to define what a product designer with a technological leaning should be, and it might guide institutions to reflect this in their course content. On the other hand, BIDA a couple of years ago got involved with a body called Creative Skills and we started to do the same thing for more ethereal parts of industrial design practice. I think that's part of a profession growing up, to go through that process."

One product of this is the National Occupational Standard, which is not a professional qualification but defines a set of skills, experiences and performance indicators.

Williamson added: "What our [BIDA's] view is that we have to set out what good industrial design practice involves. Once you've done that you can then start to talk to other bodies. And we are talking to the Institute of Engineering Designers about joint initiatives. The overall goal is to continually improve practice. But that of course affects higher education, because if people are not learning the things that are necessary when they're coming in, then improving practice is more difficult. It's a twin-pronged approach.

"Both engineers and industrial designers in the future just need to be more brainy," concluded Williamson. "We need to find ways of enabling each other to learn more about each other's skills so that we can work together better. I can see the challenges in the future - this ever increasing pace of convergence means that we've got to work even better, otherwise we going to get left behind."

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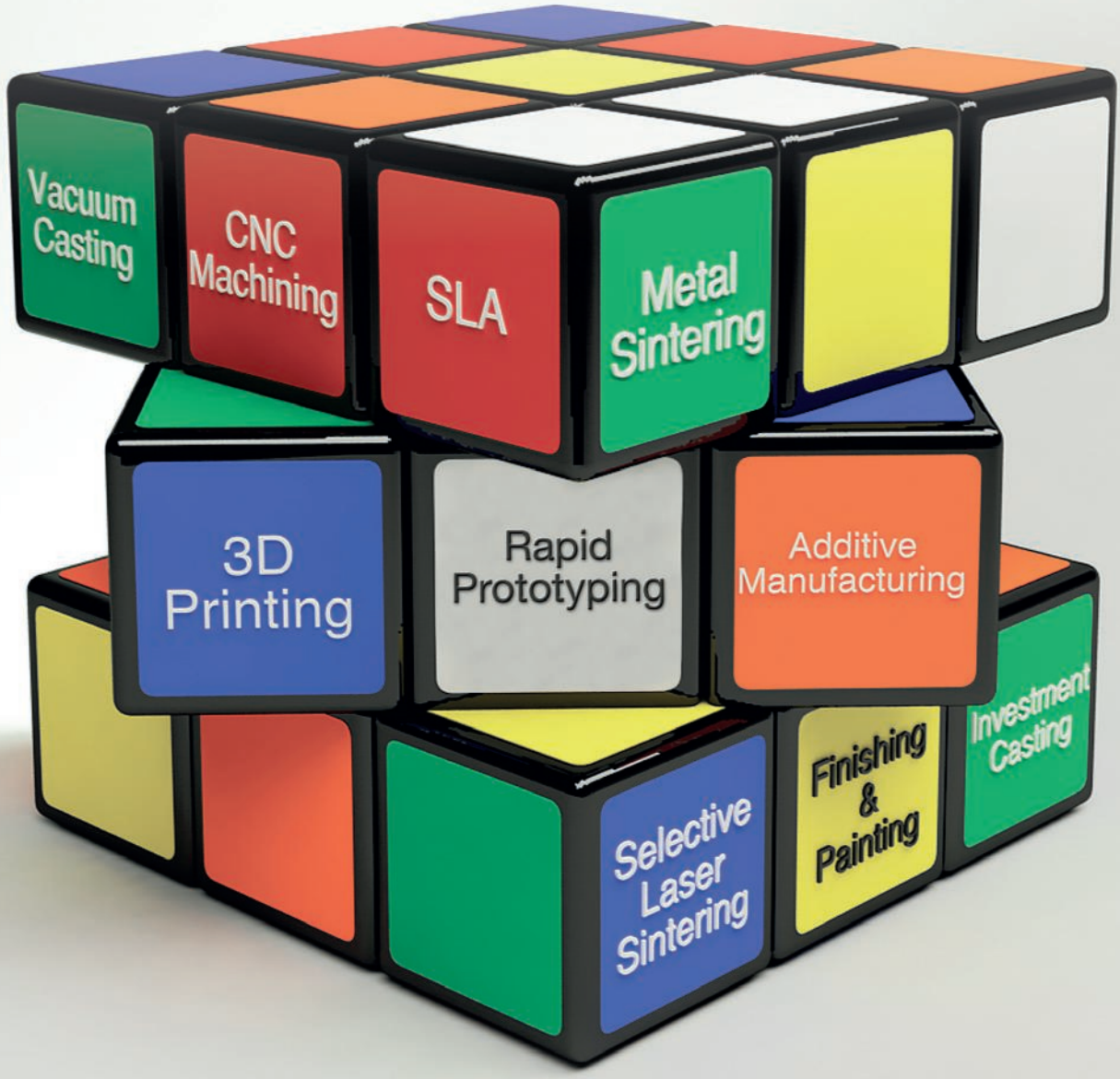

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Just what the **doctor ordered**!

Additive manufacturing has been identified by many as a game changing technology. But while it does clearly have limitations, there are those who are experimenting with the possibilities - and in the case of medical manufacturer Owen Mumford it has completely transformed the prototyping process. Tim Fryer reports.

Medical device design comes with a unique set of problems. High on this list would be product usability for patients of vastly varying ability levels, limited material options, the drive for self monitoring/medicating and of course the regulatory framework around it. Such challenges are all in a day's work for Owen Mumford, a company that specialises in drug delivery and blood sampling devices and who have formed partnerships with most of the world's leading pharmaceutical companies.

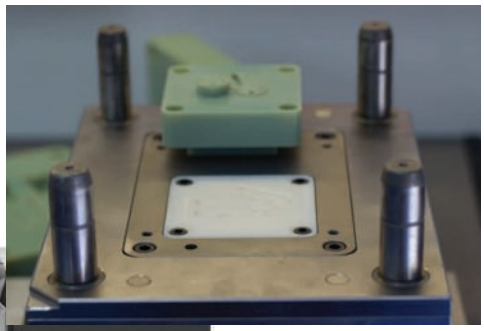
"In order to remain in that kind of market we need to innovate," claimed Andy Varde, director of research and development at Owen Mumford. "As a result of that, we have about 130 active patents filed or granted and about 600 patent families across the world to use as our IP portfolio." One product based on such IP was the world's first automatic insulin pen, and this captures the essence of the recent trend for self-administered medication, often requiring the device to be both simple and disposable.

"Human factors are critical in this space - user-centred design is really important to us," continued Varde. "The needs of a patient with multiple sclerosis are very different from the needs of a patient with rheumatoid arthritis, for example, or some other differences in terms of dexterity, or vision, or side implications of the disease itself."

It means there is significant input at all stages of the design process from a number of stakeholders, which includes user groups and clinical experts organised in structured studies to resolve particular issues, and the consequence is products that first and foremost fulfil a need. Varde explained: "Innovation is an interesting thing to define, but for me, it's bringing something to the world that makes a difference and has value in some way in that market. There is tremendous virtue in medical devices in simplicity. Devices need to be utterly easy and simple to use. They need to give the user what they need, they need to give it exactly at the time that they need it, and they need to help them as far as possible. They mustn't confuse."

Simplicity in innovation is not easy to achieve, particularly in such an iterative design process with so many people involved. But Owen Mumford has changed its whole prototyping strategy to make it a reality, and 3D printing was the enabling technology.

3D printers are increasingly used in industry as part of the product development process, but their use is restricted by the materials that can be used on them. Particularly in the medical environment, if the prototype is to be used in any

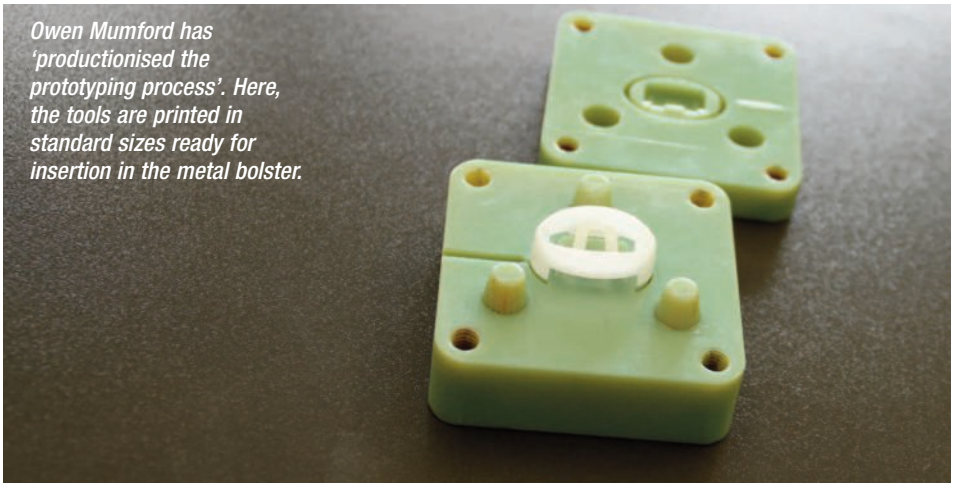


(Above) A tool ready for injection moulding. (Left) The Stratasys Objet 260 Connex printer features dual jetting technology, which allows the use of 'digital materials' – combining two base resins to provide a whole range of material properties. Describing the choice of the Objet 260, Varde said: "We had a look across the board at various technologies and this was one that I think for us, for our particular needs, was head and shoulders above some of the others."

trials involving humans or a drug which they are going to come in contact with, the materials used in the prototype need to be the same as those that would be used in the end product. Such medically-approved materials are not yet widely available for 3D printing.

Until two years ago Owen Mumford outsourced all of its prototyping, using a variety of techniques – like 3D printing, injection moulding, CNC machining and metal fabrication – as each application demanded. Toby Cowe, technology development group manager, explained the approach when it was important to get components made in the correct materials: "Three years ago we would go to a soft tool manufacturer. That would have cost round about £4000 to £6000, and it would have taken two to six weeks to make a tool."

It may have been accepted industry practice and timescales, but it was not helping the company meet its prototyping schedules. Varde started investigating the potential of buying a 3D printer outright. "We looked very carefully at what the cost benefit of doing it was, and they were really quite significant. We saved the money back we were spending on prototyping within about 12 months. The printer actually exceeded our expectations in terms of how it assisted us. We were expecting to get about 50% reduction in our outsourcing of our prototyping work, and we've achieved about a 95% reduction."



Owen Mumford has 'productionised the prototyping process'. Here, the tools are printed in standard sizes ready for insertion in the metal bolster.

The machine selected was the Objet 260 from Stratasys, selected at the time because Varde and Cowe believed it to be the most accurate on the market with resolution of 16um. As stated before, even with high quality printing at their disposal, printing prototype parts was of limited use. "Direct

3D printing can be suitable for dental applications or potentially surgical applications, but when you're looking at high volume products such as lancing devices or drug delivery devices, the inherent variability and weakness of the materials that are currently available from 3D printing would introduce risk and significant cost to the product as well. So we are using the 3D printer to create tools with which we can then use whatever material we want."

With an injection moulding machine (a vertical 35kN Boy) sitting alongside the 3D printer in the lab, prototypes are thus produced overnight, in end product materials, without the lengthy and costly procedure of having to outsource the tool design.

Cowe's team has taken the process one step further by standardising the insert sizes. A metal bolster holds the insert (the tool) which can be of two standard sizes - 70 x 70mm or 140 x 230mm. This simple innovation has opened up usage of the printer to the whole design team. Varde commented: "If it had been just left ad hoc everybody would have to reinvent the wheel every time they were trying to do something. This way all they have to worry about is getting the cavity right and then the rest of it is all predetermined. That's what makes it so much easier and faster to use as a prototyping tool for a wider group of people."

There is no substitute at the end of the day for getting something physical and doing some physical testing with it - you learn so much more. Varde

It has made the whole design and prototyping process far more dynamic, as Varde explains: "We can do three iterations in three days rather than three months. Our ability to fail early is improved by having the technology. So there's been not only the tangible benefits, the reduction in cost of paying to outsource the prototyping, but we've also had the added benefit of dramatically increasing the speed of our ability to prototype quickly and fail early, and then our ability to change what the design is based on our understanding of what we get from those prototypes."

And such has been the success that Varde is considering expanding the 3D printing capability. "We are considering maybe having one or two lower end machines just to give another string to our bow, to do very quick representational models. There are some relatively small machines now for £1500 that can produce passable representational models, just to get some early ideas."

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Taking a fast turn

Lee Ball highlights new opportunities for designers and engineers when outsourcing the rapid prototyping and low-volume manufacturing of components with cylindrical features.

It used to be so simple; round components were produced on a lathe and non-round parts on a mill. That was the case up until the introduction of the now-ubiquitous three-axis CNC machine tools as this brought in the opportunity to produce interpolated round features normally made on a lathe. With the addition of live tooling to CNC lathes, the boundaries have become a more complex as features normally the preserve of CNC mills have been introduced into the turning equation. With this potential for crossover between the two technologies, opportunities have opened up for designers and engineers to reap the advantages that the advanced production method brings.

Whereas many components with cylindrical features can be produced on a CNC mill from square or rectangular stock, there can be additional time spent removing unwanted corners. This not only wastes raw materials, but also consumes valuable machine time and

ultimately has an effect on the cost of the component. Coupled with the fact that it's hard to reach a good surface finish using milling cutters on round components, turning on a CNC lathe becomes even more attractive.

Take the same component onto a CNC lathe equipped with live tooling and designs with cylindrical forms can be quickly turned while accommodating additional features such as perpendicular axial and radial holes, flats, grooves and slots without the need to remove the work piece and transfer to a mill. Furthermore, surface finish is no longer an issue as CNC lathes are much better at generating the required cylindrical surfaces, so both the roundness and finish are much improved.

Due to the size of components and limits on

the respective machine tool capacities, there will always be cases where a piece best suited for a lathe will need to be produced on a mill and vice versa. For example, longer length-to-diameter pieces lend themselves to production on a CNC lathe.

Typically, CNC lathes equipped with live tooling can work to tolerances of +/- 0.10mm in the following dimensions:

- *Diameters ranging from 0.8mm to 75mm*
- *Lengths between 1.5mm and 228mm*
- *Wall thicknesses down to 0.5mm*

As lathes normally start off with a round bar stock, compared to the often square or rectangular stock used in three- and five-axis milling, they typically use less material and therefore can be quickly produced — saving both time and money in the process.

In our modern-day era of ever-increasing time pressures and shortened product life cycles, the desire to get new products into the market quickly and profitably is paramount. Shaving time from the development process by selecting the right machining process can be the difference between launching a product first or behind that of its competitor.

In the past, it was not uncommon for outsourced components to take many weeks to be manufactured, often inside a small, minimally equipped workshop. But customers demanded quicker access to their components and advanced, automated systems can turn out components within three days of receiving a 3D CAD model.

Production speed is crucial when selecting a supplier for rapid prototyping and low-volume production runs, but it's also important that they are able to provide advice as to the most suitable production method for a given component. They should offer suggestions on:

- *appropriate design modifications that may increase the manufacturability of the component*
- *lowering production costs through design and material selection*
- *reducing component weight*

With the accelerated pace of technological advancements within the manufacturing industry, it's certainly an exciting time — one that brings a much wider choice of methods, like CNC lathe with live tooling — that are available for quick-turn prototyping and low-volume part production.

www.protolabs.co.uk

Lee Ball is operations director with Proto Labs

The sensors and systems getting integrated into cars are getting smarter, and the reality of autonomous cars is getting closer. Justin Cunningham looks at some of the technologies acting as a precursor.

TAKEN *for a* RIDE

The UK car industry is in good health. In fact, reports last month widely labelled it as 'booming' with OEMs and its supply chain boasting impressive financial figures. Indeed, for the last few years the UK has exported more cars than have been imported. And it shows no sign of letting up, from January to June this year, manufacturers have produced nearly 800,000 vehicles. It's an impressive resurgence from an industry nearly lost in its entirety to the global recession of 2007/8.

One of the darlings of the UK car industry is Jaguar Land Rover. Its fortunes today are unrecognisable to those that nearly filed for a Government bailout six years ago. The company, today, is resolute in its development and application of cutting edge technologies, and many say it's this that's helped revitalise its position as a premium luxury brand fit for the world stage.

It shows no sign of easing up this charge as it recently announced the development of 'connected cars'. So great is this ambition, it says all of its vehicles will be 'connected' by the end of the year. So what does that mean, exactly?

Mike Bell, global connected car director, Jaguar Land Rover, explained: "The potential of the connected car is huge and we are actively embracing it. It is certainly one of our top priorities and we are making a significant investment in the technology, skills and partnerships to make it a reality."

This connectivity is based around numerous sensors, built-in telematics and fast data transmission. Does it mean data can be easily accessed via an app on your phone? Predictably, it does.

Bell continued: "We have huge potential to ensure the car has a prominent role in the Internet of Things, which will enhance driving experience and make driving smarter and safer in the years to come."

Rather unpredictably, however, is that you'll be able to drive JLR cars via your smartphone from the outside. Engineers there have obviously been watching James Bond, and been inspired?! The system connects wirelessly the vehicle's ECU, where your smartphone will act as a control pad and allow you to accelerate, steer and brake.

"Getting a car out of a tricky parking manoeuvre can be a stressful experience for any driver," said Dr Wolfgang Epple, director of research and technology at Jaguar Land Rover. "A remote control car demonstrates how we can use these new technologies to reduce the tedious parts of driving and improve road safety."

The driver can walk alongside the car, at a maximum speed of 4mph, to manoeuvre it however they like, whether that's to negotiate difficult off-road terrain – so you can get a better view of what is around the car – or to tackle that challenging parking spot.

As you might imagine there is a vast number of safety systems involved, such as stopping the vehicle if the driver moves out of range (maximum 10m) or gets too close. Any production system would also have a range of security measures and firewalls, and presumably questions around latency have been thought about. It wouldn't be ideal if it unexpectedly takes a few extra metres to brake.

It might seem a little gimmicky, and it is, but many in the industry are looking at JLR's technology lead here with envy, and there are two reasons why. Firstly customers love it. It's a great marketing and promotional point that is popular simply because it is 'cool'. You can imagine customers taking it for a test drive around the showroom with their smartphones. It gives some customers all important additional bragging rights. But, let's face it, in all likelihood it is never going to bring any real or practical day to day benefit.

Autonomous vehicles

The other, perhaps more important reason, is that this is a step towards fully autonomous vehicles. It is an important scene setter not just for the company, but for the industry more broadly. However, the company is keen to play down the prospect of fully autonomous vehicles, probably as most JLR owners and perspective buyers like to drive, even if autonomy is an option that will be able to be turned off.

"Research into technologies like these won't only help us deliver an autonomous car, they will help make real driving safer and more enjoyable," added Dr Epple. "The same sensors and systems that will help an autonomous car make the right decisions, will assist the driver and help prevent accidents. Autonomous car technologies will not take away the fun of driving."

The company is developing the sensing and analysis software at the moment that is handing over increasing control to the vehicle. Even if the driver gets distracted, the car will be able to take evasive action and avoid collision.

The sensors being trialled and assessed include radar, lidar, cameras and structured light. All have relative merits and detractions in being able to 'read the road' by sensing other road users and identifying pedestrians.

One of the cornerstone sensing technologies for autonomous vehicles is image processing and stereo cameras. These are excellent at object classification. The technology is quickly advancing and a forward facing stereo camera is being mounted behind the front windscreen of the new Jaguar XE to scan the road ahead and build up a 3D image. This gives the ECU highly accurate data about the road ahead and is being used to provide autonomous emergency braking (AEB) as well as triggering a lane departure warning.

The stereo camera can detect vehicles up to 100m away and if the algorithms in the AEB control module determine that a collision is likely, the brake system is pre-charged and the driver receives a visual warning in the instrument cluster and, if fitted, the head-up display. If no action is taken, full braking force is triggered automatically.

The traffic sign recognition system relies on the stereo camera to keep the driver informed of speed limits - including temporary limits which apply in roadworks, for example. To ensure a high degree of system robustness, camera data is always cross-referenced with speed limit information from the navigation system. A driver-selectable function enables subtle notifications if speed limits are exceeded: a ring flashes around the speed limit image, but there is no audible warning. In addition to road signs, the advanced stereo camera also 'sees' road markings. This capability is used by the XE's lane departure warning system. Here, the driver receives haptic feedback through the steering wheel to prompt a correction.

In addition structured light can be used to produce a pattern of light. When projected onto the road ahead, it can be used to measure the topography of the ground. If a pattern is projected onto a smooth surface it will be geometrically perfect, but a bump or hole on the surface will distort the pattern.

Pothole protection

This is having an interesting application in identifying potholes and could allow a vehicle to identify their location and severity, and then share this data in real-time with not only other vehicles but also road authorities to help them prioritise repairs. If a car receives a warning about a severe pothole then the driver can slow down and avoid it or the car could automatically adjust its suspension settings to reduce the impact and smooth the ride.

Dr Mike Bell, explained the vision: "While this gives our customers a more comfortable ride, there is a huge opportunity to turn the information from these vehicle sensors into 'big data' and share it for the benefit of other road users. This could help prevent billions of pounds of vehicle damage and make road repairs more effective.

"Ultimately, sensing the road ahead and assessing hazards is a key building block on our journey to the autonomous car. In the future, we are looking to develop systems that could automatically guide a car around potholes without the car leaving its lane and causing a danger to other drivers."

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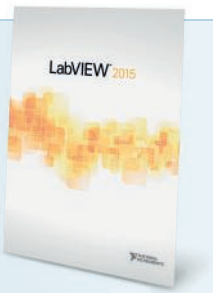

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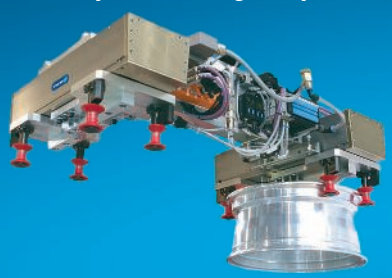

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All change at the next station

High speed rail moves at a notoriously slow pace in terms of innovation. But is the ultra conservative approach changing? Tim Fryer looked at one project that suggests it is.

The rail industry does not move at great pace. Part of this is down to a fear that change might jeopardise safety, and safety is of paramount importance in rail transport. And it is also in part down to the fragmented nature of the rail industry. It is effectively a series of monopolies running in parallel with each other – only one train, run by one operator, can run on the only available track, at any one time, operating under a single raft of regulations.

"There's this very wide stakeholder panel," said Dr Jon Spratley, director of 42 Technology. "It's actually quite hard to drive innovation into a structure like that. It is a complex sell. You have got to show benefit to all of them and it only takes one of them to fail to see the benefit and effectively block it."

There is consequently a huge amount of inertia in the rail sector and to try to overcome this and stimulate some innovation, the Future Railway programme was launched by Network Rail and RSSB (Rail Safety and Standards Board). One competition run by Future Railway was to look new ways of thinking about the rolling stock, and that competition has yielded some thought-provoking designs.

One of the three finalists was 42 Technology, whose Adaptable Carriage requires a fundamental change of thinking about the railway's business model as well as some neat engineering.

Spratley summed up the lack of change in the rail industry and why Future Railway is important: "If you start with a very rigid set of boundaries, you're going to get what the boundaries define, and that's going to be what you have today, because that's what the boundaries have been put there to enforce." The argument continues that the rail industry knows it lacks innovation, recognises it needs it and so, through initiatives such as Future Railway, is inviting people from the outside who are inherently innovative and are not restrained by the established culture.

One advantage of the Tomorrow's Train Design Today competition is that not only has it provided the impetus for coming up with a new design, it has also provided a way of judging acceptance by all of the aforementioned stakeholders. Spratley observed: "Initially a lot of it was really about the vision, but we're a team of engineers and it's very difficult to keep engineers out of the detail. So we went in knowing that the sort of technologies that would be required were very feasible. What we didn't have at that point was the proof that the industry was interested – and the feedback that we've got

The Competition

'Tomorrow's Train Design Today' was an international challenge set out by Future Railway in association with the Department for Transport and the Royal Institute of British Architects. The challenge for architects, engineers and designers was to propose new design solutions to improve passenger rolling stock across the UK rail network.

48 entries were initially received and a shortlist of ten designs selected to further develop their schemes. The ten designs selected in August 2014 were given grants of £75,000 and had until January 2015 to develop their schemes. The three teams then identified as finalists were 42 Technology, Andreas Vogler with the German Aerospace Center DLR, and PriestmanGoode. £2.2 million has been made available to fund the next stage development.

The Andreas Vogler entry (pictured above) is for a double-decker high speed train design. The AEROLINER3000, specifically for the UK rail network, completed an in-depth feasibility study for the double-decker along with German Aerospace Center (DLR), Institute of Vehicle Concepts, in Stuttgart.

PriestmanGoode (below) focussed on medium term designs for rolling stock interiors with a focus on flexibility and adaptability. Director Paul Priestman, commented: "Passengers are already facing cramped conditions. It's imperative that we find a long term solution to tackle the big issue of rail overcrowding, to alleviate pressure on the system, improve passenger experience, quality of life and value for money."

from it is overwhelmingly positive."

The company's Adaptable Carriage idea, which is now being developed towards a demonstrator level, opens up a business model for the industry that doesn't currently exist. The premise is to be able to quickly convert a passenger carriage into one that can take high-value goods. Trains travelling into a city can be packed during the morning rush hour, but are effectively shipping fresh air on the return journey.

"Our idea is that you reconfigure the trains so that you make use of that space and you can then move goods out of the city in the morning and into the city in the evening," explained Spratley. "It's on an infrastructure that's already paying for itself, which means any margin to be gained from the movements of those goods essentially goes onto the bottom line. It's a business model that's been proved in the aircraft industry for a number of years."

When initially working through the idea, it was proposed that an option may be to stretch out seating when it was quiet, or add in a coffee bar, or when busy introduce 'perch' seats to allow more people to have some level of seating. However, it emerged that the only two viable options were to have the carriage as all seating or all cargo. "It just was the simplest solution that made sense," said Spratley.

That simple solution is to concertina up the seats so that it leaves space for standardised pallets to be loaded. For the scheme to be commercially viable the reconfiguring of the carriage, including checking that there is no one sleeping under the seats, reconfiguring the carriage and loading the cargo (or vice versa), must be under five minutes, the typical turnaround time of a rush hour commuter train. Most importantly, the seats have to be able to lock securely into position so that passengers have complete confidence in safety.

Until the project is finished and suitable IP has been put in place, 42 Technology were unable to give too many details, but the emphasis in terms of how the seat movement and carriage

reconfiguration process would take place is, again, to keep it as simple as possible. Tom Copeland, senior mechanical engineer at 42 Technology commented: "We will have as few moving parts as possible. Everything wears out in time, especially when you are running cables and using motors – the more complex the system the less reliable it will be. The automation system is based in a single, highly reliable and secure place."

One of the biggest challenges will be the seat mechanism and how it moves reliably and robustly. The main mechanical test for this is the crash test and 42 Technology's design needs to cater for the industry standards in this respect.

Copeland said: "[The safety] comes from the way the seats are anchored when they're in the passenger position, through the structure of the seat itself. The load is actually put on the top of the seats, and so that whole system needs to be strong enough. It's a big challenge."

Such challenges are typically where 42 Technology starts its design process. Spratley revealed: "We tackle the difficult bits first. So whatever the biggest risk is, let's solve that bit, let's create a prototype and a test piece of that bit, let's make sure it can work. If you've ticked off the difficult areas and you've packaged it up together, when you make your first prototype you've got fairly good confidence that it will work."

It seems the big test will not be the engineering, but in the industry's acceptance of this innovative solution. Is it on the right track or will it be left standing on the platform?

www.42technology.com

Could this work for HS2?

"I think it would be absolutely ideal for them," said Dr Jon Spratley, director of 42 Technology. "But there are some different requirements with high-speed trains. It's all to do with the wind pressures on doors. You tend to find that high-speed trains have much smaller doors, which makes it harder to load cargo in and out. It's not insurmountable - if it was felt that the business case warranted it, I'm sure it's not beyond the wit of man to design a train that could both go faster and have wider doors. However, as things currently stand, it would be quite a limitation. You couldn't take a Eurostar type train with the two little doors at the end. It would take you half an hour to load a carriage full of cargo, one box at a time. It wouldn't be feasible. So it has different challenges. And whilst we are very open to considering that, that's not our primary focus, because I don't think HS2 is in a position to have that level of engagement yet. But I believe the trains are going to be something like 400 metres long for HS2, which in peak hours they're looking at running short lengths. This means either stowing a couple of hundred metres of carriages somewhere, or filling it with something else to generate revenue."

Engineering design show

PREVIEW

Exhibition – Conference – Workshops

Jaguar Exhibition Hall, Ricoh Arena, Coventry. 21 – 22 October 2015

Sponsored by

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RS

Meeting your **job definition**

What is it that defines how you do your job?

If you were asked to give one word answers to that I am guessing top of the list may be 'Innovation'. Even if products or markets are mature the job of the engineer is to design in change – it may be to improve the quality of the product, add functionality, make it easier to produce... any number of things. But the only way that the engineer will achieve his or her goal is to innovate.

What else? Cost may be second on the list. Everything has price pressures and typically a compromise between what the engineer would like and what can be afforded is reached with what the engineer is willing to accept.

And I suspect third on the list would be time. Smaller teams, more work, more complexity, more to learn and of course the demands from the market to squeeze development cycles.

Innovation. Cost. Time.

In the past the approach to these issues has been to bury the collective head in the sand, but this strategy has lost favour of late - they are issues that have to be addressed.

And they are issues that we have endeavoured to address since the inception of the Engineering Design Show (EDS).

Innovation is spread throughout the exhibition halls as well as the conference and workshop theatres. The Innovation Zone (more of which in the October issue of Eureka) will present some of the most inspiring and exciting designs around.

And while the majority of suppliers at EDS will be aware of the cost-pressures facing design engineers, and will be working with them to ensure that these pressures are manageable, EDS is playing its part by making the cost of visiting negligible. In fact access to all the content – the conferences, workshops or the exhibition halls themselves – is all free.

The main cost is your time.

Time is probably the biggest pressure facing all of us, so having so much new technology crammed into one venue, accessible for a day's visit, presents huge value in itself. How long would it take to go to all of those conference sessions individually, or visit all of those leading edge suppliers one at a time? The alternative would be to not have all that information at all and few can afford the luxury of not keeping abreast with innovation.

Whatever your main driver is I believe that EDS will be worthwhile. The following pages introduce the event. A few late announcements will be made in the October issue although you can keep up to date, as well as register for the show, conference sessions and workshops, by visiting: **www.engineering-design-show.co.uk.**

Tim Fryer, Editor

The most important thing is to put 21 – 22 October in your diary.

Contents

Opening Times
Wednesday 21st October
10:00 – 17:00
(Conference starts at 9.15)
Thursday 22nd October
10:00 – 16:00
(Conference starts at 9.15)

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Engineering design show

Is there a better place to expand your knowledge base? The Engineering Design Show has a full programme of conferences and workshops so that your visit to Coventry can go beyond networking and meeting suppliers, it is a place for learning and inspiring. There really is a feel of best of British as our presenters tackle the leading edge of engineering design. Ben Ainslie's America's Cup boat needs to gain seconds through the water, while the Williams F1 team needs to find fractions of seconds on the track. The British airship industry is about to take off and space is far from being the final frontier. All these subjects and more will feature in the Eureka Conference at the Engineering Design Show.

Indepth analysis of particular technologies will be the focus of the workshop theatres that run on the exhibition floor during the course of the event. Details of these are on page 45. To keep up to date on the latest speaker and content information visit the dedicated website (www.engineering-design-show.co.uk) where it is also possible to reserve your place at any of the conference or workshop

EUREKA CONFERENCE
WEDNESDAY 21ST OCTOBER

09:15

Engineering success in the America's Cup

Andy Claughton, Technical Director, Land Rover BAR

The America's Cup, which has never been won by Britain, is the ultimate sailing challenge. Fortunately the Land Rover BAR team has the world's best sailor in Sir Ben Ainslie at the helm. It has also been described as being as much of an engineering competition as a sailing one. Andy Claughton is the man responsible for engineering the boat that will challenge for the next America's Cup and in this presentation he will outline the challenges, the strategy and the reliance on engineering expertise from around British industry.

10.15

Automotive - how a small company competes and beats the big guys

Andy Poon, Chief Executive Officer, Romax Technology

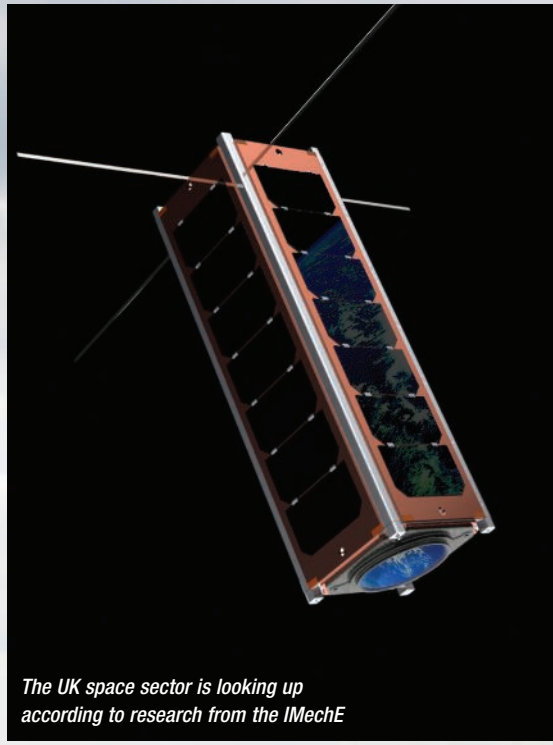
Last year's Grand Prix winner at the British Engineering Excellence Awards was design consultancy Romax Technology. In this presentation they will describe how excellence in engineering is a core philosophy for the company and outline how this influences many aspects of the company, from the day to day operation to the development of products and services going forward.

Hybrid Air Vehicles will describe the design of the aircraft that will relaunch the British airship industry

Cyclogyro propulsion could revolutionise air travel

Composite materials were the key to achieving world-record breaking speeds

Solar Impulse will rely on advanced materials technology if it is to make it round the globe



The UK space sector is looking up according to research from the IMechE

How do you turn your company into Award-winners? Ask Andy Poon, CEO of Romax

11.15

D-Dalus - getting off the ground

Meinhard Schwaiger, Inventor and David Wills, R&D Director of D-Dalus

Based upon a unique form of cyclogyro propulsion, the D-DALUS aircraft could eventually revolutionise the way we travel.

The presenters from IAT21, the company behind the project, will explain the science behind the cyclogyro and describe how such a propulsion system could be used eventually for passenger travel, obviating the requirement for airports, seriously reducing congestion and generating considerable environmental benefits.

12.15

Engineering in isolation - the battle to control infection

Mike Phillips, Design Development Director, Renfrew Group

It's often said that engineers save more lives than doctors. Well it's time to step up to the plate…

Urgency needs to be created around the threat to humanity posed by emerging infections. The close shave with the recent strain of Ebola and constantly mutating flu's are but a couple. Vaccines provide incremental protection from these but what about AMR's (Antimicrobial Resistance)? At present it is not financially attractive for the Pharma industry to produce alternatives or new antibiotics. So what can design and engineering do to help interrupt spread and increase preparedness for the 'double unknowns'?

13.15

High-performance engineering - achieving world records

Graham Mulholland, Managing Director, EPM Technology

Graham Mulholland will be giving an introduction to his business and also an overview of the projects he was involved in with Guy Martin and his 'Speed' television series. The gravity sledge, gravity racer and tandem bike were produced by EPM Technology, all primarily using composite materials to achieve the world records and re-define the boundaries of high-performance engineering.

14.15

The Airlander, the world's biggest aircraft

Chris Daniels, Head of Partnerships, Hybrid Air Vehicles

The Airlander is the very latest in aerospace, fusing aerodynamic and aerostatic lift in an innovative manner. It takes the best of aeroplanes, helicopters and airships to create a ground-breaking aircraft with unprecedented endurance (up to three weeks) and unprecedented flexibility on moving cargo from point to point, landing and taking-off from water, ice, desert or marsh.

THURSDAY 22ND OCTOBER

09.15

From Formula 1 to Formula E... and beyond

Williams Advanced Engineering

Find out from one of the biggest names in motorsport how F1 innovations are being applied to the wider world, even beyond the automotive industry. In particular, this session will go into detail about how energy storage technology developed for F1 is trickling down into other areas of motorsport, and even outside of racing altogether into the mainstream.

10.15

Making Solar Impulse light enough to fly

Covestro (formerly Bayer Material Science)

This presentation covers the work done to develop the materials for the Solar Impulse aircraft, which is currently traversing the globe powered by nothing more than the sun. Development of the materials and their careful design was vital to make Solar Impulse airworthy. This landmark project utilises just about every materials engineering trick in the book.

11.15

'Whole system design' for the E-Car sector

Dr Nicolas Sergent, Powertrain Architect, Riversimple

Eco design in the automotive sector does not have to mean ugly cars! In fact, Riversimple's prototypes are quite the reverse – beautiful cars that can do 300mpg with emissions amounting to little more than a splash of water. The design of the car is as revolutionary as the design process, which Riversimple describe as 'Whole System Design', as well as the end offering - a 'mobility service' rather than just a car.

12.15

Materials management for eco-design

Andy Clifton, Manager – Sustainable Development, Rolls Royce

Material data is an important element of sustainable industrial design. This presentation gives examples of the risks that this data helps to manage and what is needed for the tools and systems for data management and eco-design to be integrated into industrial design processes.

13.15

Embracing the world of innovation

AJ van Bochoven, Head of innovation strategy and process, Cambridge Consultants

Innovation is the lifeblood of most industries but can cause casualties for those that don't embrace it. This presentation will show how great companies have innovated over time and how successful companies try to maintain the innovation spirit in the face of increasing competition that threatens to disrupt their leadership position. We will also explore what you think when it comes to innovation and how the retail landscape is evolving with competitors embracing new innovations.

14.15

Cube-sats: the changing face of 21st century satellite technology

Dr Helen Meese, Head of Engineering in Society, IMechE

This presentation will look at the growing small satellite market known as Cube Sats. It will focus on how these satellites are being developed and used, some of the technological innovations being created in the UK and the downstream data applications which are growing as a result. It will also look at the technical challenges faced by the satellite industry and some of the barriers to exploiting this market.

DAY 1

Workshop Theatre 1

11:15
High Performance Polymers for Metal Replacement
Nigel Barrow, Technical Manager, EMS Chemie UK

12:15
Fundamentals of Engineering Material Selection
Nylacast

13:15
Joining light weight to alloys high strength steel. The future of Body-In-White assembly.
Steve Wynn, Sales Manager, EJOT

14:15
When dreams come true; new thermoplastic materials for lightweight
Manfred Bär, Head of Product Management, Akro-Plastic

Workshop Theatre 2

11:15
TBC
RS Components

12:15
Reduce your manufacturing costs with CIM and MIM
Walter Kuhn, Product Manager CIM/MIM and Paul Williams,Senior Sales Engineer, maxon motor

13:15
Sweet spots for 3d printing: recognising profitable and durable applications
Iain Hill, Account / New Business Development Manager, Materialise

14:15
TBC
National Instruments

DAY 2

Workshop Theatre 1

11:15
High Performance Polymers for Metal Replacement
Nigel Barrow, Technical Manager, EMS Chemie UK

12:15
TBC
Comsol

13:15
Robotic 1k foam sealing, linking Prototype to Production
Robert Jones, Managing Director, CeraCon

Workshop Theatre 2

10:15
Understanding RIM and how it can support your product development
Rachel Sparkhall, UK Sales and Marketing Manager, Midas Pattern

11:15
Digital Manufacturing – precision, scale and speed.
Damian Hennessey, Commercial Director, Protolabs

12:15
Reduce your manufacturing costs with CIM and MIM
Walter Kuhn, Product Manager CIM/MIM and Paul Williams,Senior Sales Engineer, maxon motor

13:15
Sweet spots for 3D printing: recognising profitable and durable applications
Iain Hill, Account / New Business Development Manager, Materialise

14:15
The Best Kept Secret in CAD
Kev Moran, Technical Consultant, and Simon Lotus, Sales Account Manager, Majenta PLM

Sessions presented by industry leaders such as:

CeraCon
COMSOL
BECKHOFF
EJOT
EMS
EMS-GRIVORY
K.D. FEDDERSEN
Think Value
Materialise
innovators you can count on
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Connecting *with* electronics

One of the great strengths of the Engineering Design Show is its co-location with two sister events - the Electronics and Embedded Design Shows. Tim Fryer looks at why this adds to the mix.

electronics design show

Electronics, according to our reader survey earlier this year, is a component part of 71% of our engineers' projects. Over two thirds of this electronics design is done by specialist electronics designers, which still leaves a third, principally mechanical engineers, who are having to incorporate electronics into their design skill set. However, whether you are doing the electronics design or someone is doing it on your behalf, what is becoming increasingly important is an understanding of what is possible.

It doesn't matter if you are designing for a high volume consumer environment or one-offs in specialised industrial automation – every customer wants more functionality and more inherent product intelligence. The Internet of Things is a fantastic opportunity for all involved in product development, but it can also be daunting to an engineer whose expertise lies in the mechanical.

Understanding the Internet of Things

The building blocks for the IoT are in the electronics, whether your objectives are limited to getting two bits of adjacent plant in a factory to talk to each other, or communicating with a fridge (why is it always fridges when people talk about the IoT?) on the other side of the planet, there needs to be the appropriate gadgetry for sensing, powering, controlling and communicating.

Such gadgetry can come in modular form or in its raw component parts, but an understanding of how it can be integrated into the bigger project is essential if the design process is to be an efficient. It highlights the significance of the integrated design team and the importance of mutual understanding across the disciplines.

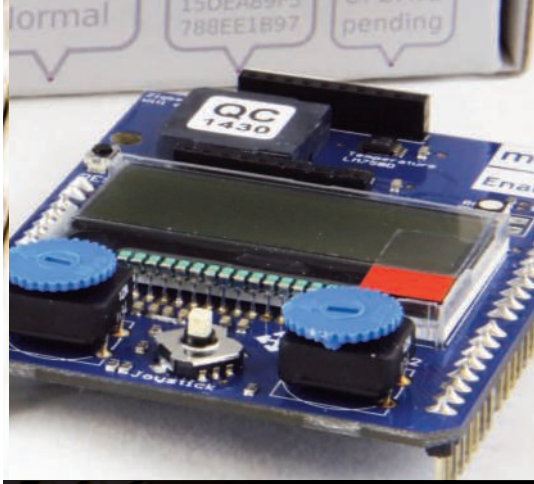
Expert industry suppliers

These are the reasons why the co-location of the Electronics and Embedded Design Shows alongside The Engineering Design Show is such an advantage. Electronics and embedded engineers now have established events that specifically serve their own areas of interest, as design engineers have had for several years with EDS, but there is no doubt that by having all three together it is potentially of benefit to everyone.

Ed Tranter, executive director of Findlay Media, commented: "This is a classic example of the whole being greater than the sum of the parts. It reflects the evolving shape of the design function, either from the perspective of a team or an individual."

Eureka readers will undoubtedly find most relevant products and services within the Engineering Design Show exhibitor area, but there is free access to the Electronics and Embedded Design Shows (no need to register separately) where solutions to particular electronics questions are waiting to be answered.

Such questions could involve the fundamental under-the-hood technology and there are plenty of the leading global companies, like Analog Devices, ST Micro and Freescale, on



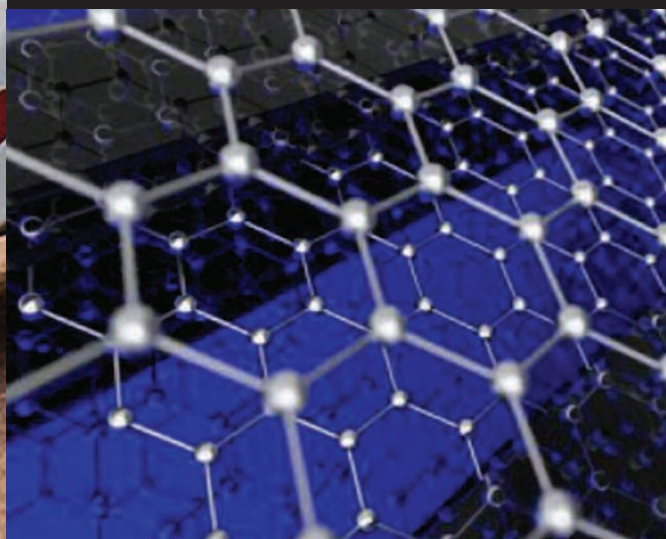
Hear the pros and cons of using new prototyping platforms

Discover the electrical design behind an autonomous car

See the LUTZ Driverless Pod, the future of personal transport

Learn about the technology behind a 5G future

See the benefits of using graphene and 2D materials



The New Electronics Conference 21-22 October 2015

Day 1

10:15

Lessons from the trenches creating better embedded systems.

Adam Taylor, Chief Engineer - Electrical Systems, e2v

11:15

Accelerating IoT innovation with mbed device platform

Peter Aldworth, Senior Hardware Architect, ARM

12:15

Challenging our assumptions on choices of Silicon for systems

Panel debate hosted by Doug Amos, Network Director, NMI. Panellists include Adam Fletcher, E2V, Clive Bunney, Swindon Silicon Systems and Andy Culmer, ITDev

14:15

The Internet of Things: Why is the promise taking so long to fulfil?

Professor William Webb, CEO, Weightless

15:15

Counterfeit components – can you sleep easy?

Mark Shanley, Global Business Manager - Military, Astute

Day 2

09:15

5G - The future of mobile communications

Professor Andy Sutton, Principal Network Architect, EE

10:15

Developments in graphene & 2D materials

Professor Andrea Ferrari, Cambridge University

11:15

Enabling the automotive IoT, Big Data hits the road

Andrew Birnie, Auto MCU Systems Engineering Manager, Freescale

12:15

Off-the-shelf prototyping

Jake Turner, Embedded Software Engineer & Jonathan Pallant, Principal Engineer, Cambridge Consultants

13:15

The Long and Short of It - Taking the long view of lowest total cost of ownership to avoid costs and shorten time-to-market

John Simpson, Plexus

the exhibitor list. Control, instrumentation and test issues – typical cross-over engineering disciplines – could be answered by a host of companies including National Instruments, Keysight Technologies and Rohde & Schwarz. Mechanical engineers often look to partners to design and manufacture PCBs and subsequently assemble them and there are many who provide such services for both prototyping or volume - a few examples are Bytesnap for design, Beta, Exception and Eurocircuits for PCBs and Datalink and IEW for board assembly.

Of course there are many component specialists, design/simulation software suppliers and also the might of the leading distributors, like Premier EDA, RS Components, Mouser and Digi-Key, who are increasingly not only experts in supply, but also a valuable technical resource in their own right.

Workshop programme

Like the Engineering Design Show, the exhibitors' halls are only half the story. There are also dedicated electronics workshop and conference programmes, organised by Eureka's sister magazine New Electronics, each providing different types of information. The conferences deal with industry wide topics and industry leading projects, while the workshops drill down more specifically into certain technologies. Again, like the Engineering Design Show, both workshops and conferences are free but places are limited and so it is important to register in advance, which can be done through the website – www.electronics-design-show.co.uk.

As stated above, the Internet of Things is one of the key cross-over areas where design engineers of all disciplines need awareness. This is reflected in the workshop programme with sessions covering wireless sensor networks, wireless connectivity solutions and end-to-end security in the IoT. Other sessions will look at E-CAD libraries and component management and the use of thermal simulation to solve PCB problems.

New Electronics Conference

The conference programme, which at the time of writing still has a couple of presentations to be confirmed, can be seen in the table ot the left. One paper that has resonance throughout the engineering community will be Mark Shanley's talk on counterfeit components. With the resolution of some high profile cases in the USA which have led to lengthy prison terms, anti-counterfeiting has suddenly become big news. If you are a supplier to defence companies, unless you take very stringent measures to ensure your component sources, then you too could find yourself in severe difficulties. Shanley will outline the legal situation.

On the second day a highlight is sure to be Professor Andrea Ferrari's presentation about graphene. Still capturing the imagination of press and academia, is graphene likely to fulfil its promise and become the next genuinely disruptive technology? Or will the inevitable inertia of switching over technologies cause its take-up to be less dramatic? Prof Ferrari will examine the short and long term potential.

There are many other gems in the conference and workshop schedules so if you have a time to look outside what the Engineering Design Show has to offer, the Electronics and Embedded sister shows could make your visit even more worthwhile.

www.electronics-design-show.co.uk
www.embedded-design-show.co.uk

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Abssac

Now in its 4th year at the Engineering Design Show, Abssac is using the event to focus on the 30 years of experience in supplying precision ball screws. Typically, Abssac supplies ball screws with outside diameters in the range from 1.8mm to 25mm for the precision ranges and up to 80mm on the transport ranges, each with a range of leads per diameter. Whether the requirement is for a precision rolled or precision ground ball screw, Abssac can assist in specifying the right part for the application and welcome the opportunity to develop linear solutions within tight cost budgets. With a rapid turnaround many ball screw customers often request that the journal ends of the screws are supplied pre-machined, so that the parts are ready to fit. This eliminates potential scrap rates for the customer, but also ensures that the assemblies are supplied and certified to the accuracy tolerances required.

Acorn Industrial Services

Rollon has broadened its range of actuators by recently acquiring Tecno Center of Italy. This acquisition will expand Rollon's current range with complementary and technologically advanced, more complex products, offering complete solutions into many different sectors. Authorised Rollon distributor Acorn Industrial Services will be showcasing the Rollon actuator range, together with its wide range of high quality linear motion products, including Telescopic Rails, X rail and Compact Rail.

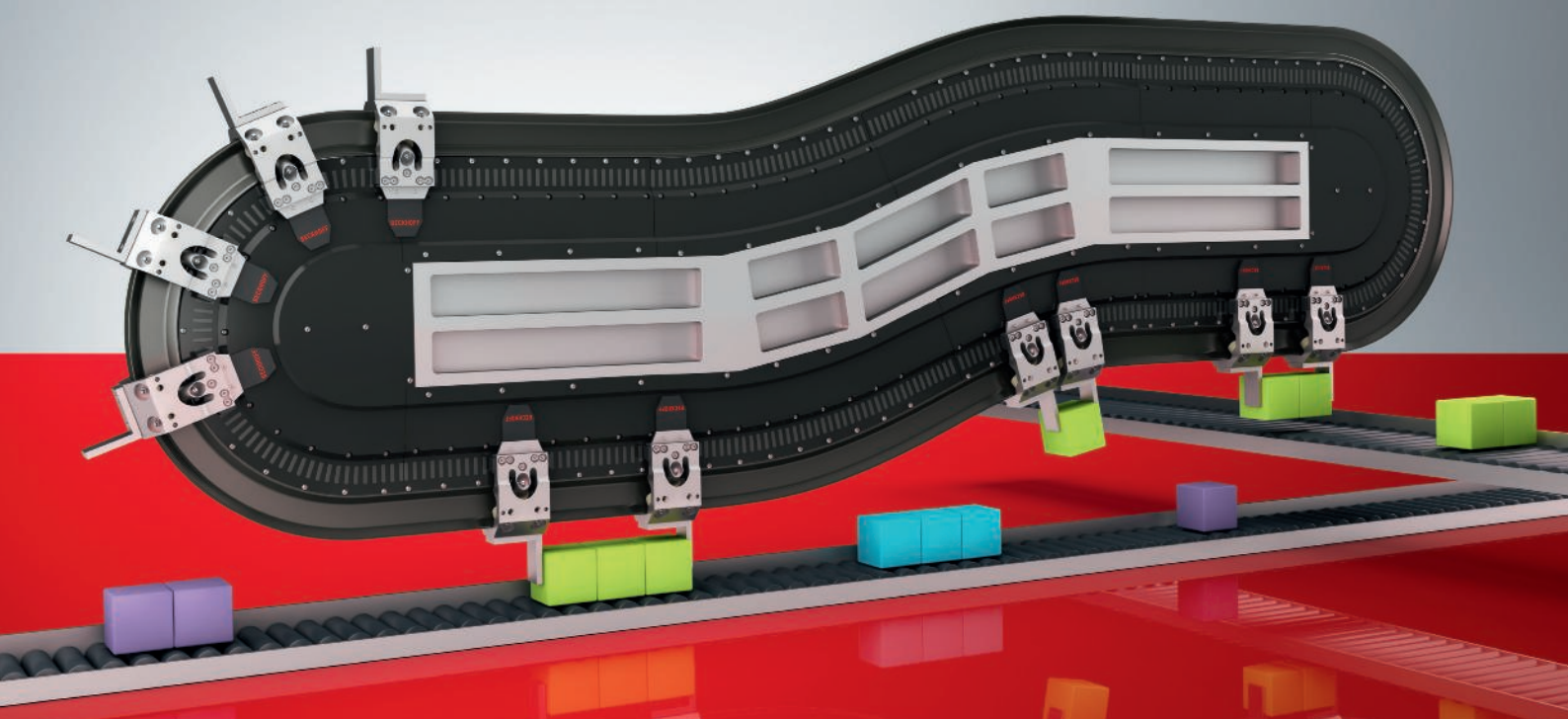
AES and EveryWare

Innovation and problem solving is at the heart of both AES and its sister company EveryWare. At EDS they will demonstrate how a fast-growing, innovative electronics manufacturer is providing solutions for clients across a range of sectors and how it can harness the internet of things to provide a visual platform for companies to monitor any measurable and react accordingly in real time. With its origins in the UK manufacture of PCBs for more than forty years, AES has manufactured electronics devices for applications as diverse as automotive lighting, airborne and underwater systems, medical equipment and security devices.

Expertise in every aisle

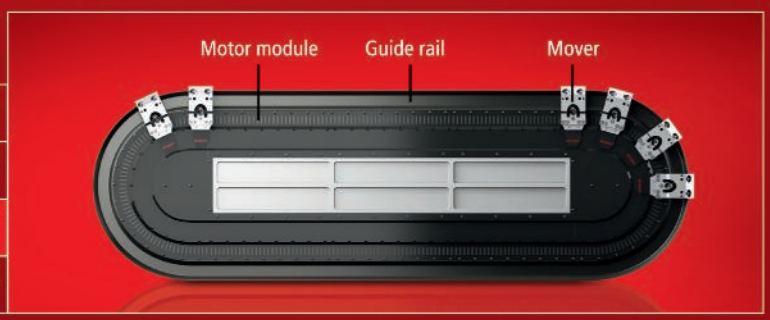
Real expertise is hard to quantify. Finding answers can be easy if the questions are well defined. If you want to know what year additive manufacturing was developed then a quick Google search will reveal it was 1981. But if you are an engineer who wants to know if 3D printing is suitable for you, or what particular additive manufacturing technology is the most relevant, you need expertise. You need people who understand a problem and can take a discussion in whatever direction that engineer needs to go in. This is why exhibitions still have an important role. They are a platform for information exchange – from one expert to another – that no internet search can ever replace. And the Engineering Design Show will have over 200 companies ready to provide this expertise across all engineering topics. We asked these exhibitors to give a brief overview of who they are and what the visiting engineer will be able to see at EDS.

Fast product changeovers for highly flexible production processes: with XTS.



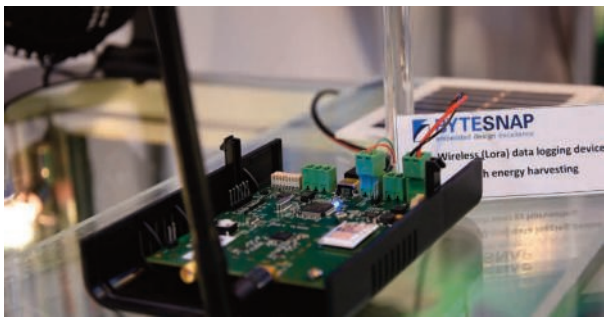
www.beckhoff.co.uk/XTS

With the eXtended Transport System (XTS), Beckhoff offers the ideal platform to flexibly change products and formats, and to implement small lot sizes quickly and efficiently, all without mechanical reconfiguration. The XTS combines the advantages of rotary and linear drive systems, making completely new mechatronic machine designs possible. Complex and expensive mechanical devices are replaced with flexible software functionalities. The linear transport system consists of 1 to n cable-free movers, modular linear motors with integrated displacement measurement, and mechanical guide rails. With this modular and scalable set of components, the most diverse applications, geometries, lengths, and radii can be implemented.



IPC
I/O
Motion
Automation

New Automation Technology **BECKHOFF**



Bytesnap

ByteSnap Design is an embedded design consultancy, and will be showing its new SnapUI user interface framework - offering several benefits including Open GL hardware acceleration, smaller footprint, faster prototyping and reduced power usage.

In addition it will showcase a highly customisable LoRa demonstration with ruggedised data logger and 10km remote monitor. This offers a battery life of at least five years. Also, discover how using the company's new EMC chamber for prequalification tests can accelerate development – bringing time and cost efficiencies.

Curtiss-Wright Surface Technologies

Curtiss-Wright Surface Technologies provides surface treatments, which will improve the life and performance of critical components, through its global network of over 70 operating divisions and specialist onsite teams. These surface treatments have been successfully used by OEM's in major industries such as aerospace, automotive, oil and gas and power generation for many years.

In a bid to meet customer's logistical challenges, the company offers a 'one stop shop' solution providing a wide range of surface treatments including Controlled Shot and Laser Shock Peening, bespoke and trade Coating Applications, Thermal Spray Coatings and Parylene Coatings for metal, alloy, plastic and electronic components as well as Analytical Services.

Cambion

Cambion is committed to ongoing product development and as a consequence is now offering a range of Compression Contacts (aka. Pogo Pins) commercially sold as discrete contacts or part of a connective system. The new range has already successfully gained approval from a number of Blue Chip companies both in the UK and internationally across an array of markets.

Ceema

Formed in 1981 Ceema is ISO 9001:2008 accredited. Its goal is to provide 'complete solutions' for engineering, design and recruitment requirements. Ceema combines aspects of electronic, mechanical and software engineering to develop design solutions from concept through to production.

EJOT

EJOT will use a customised rig to demo the EJOWELD assembly process. Five years in development, EJOWELD has been driven by market demands for lighter vehicles. High strength / light weight materials cannot be secured effectively by means of a traditional self pierce rivet. The EJOWELD process creates a high strength fix – typically between light alloys to boron steel of up to 1800 megapascals. A sophisticated friction weld system deploys specially developed components to secure structure of assembly; a pin for single-sided fixing, and a rivet requiring double sided access. EJOWELD generates no sparks or flash and the process creates very little noise while localising heat generation.

Whilst EJOWELD will take centre stage, the team will equally promote all EJOT threadforming technology, designed to achieve cost reduction through more efficient fastening and parts rationalisation.

EMS – Chemie

EMS comes to the show with the news that it has been Supplier of the Year by General Motors. The German car maker Opel relies on high-performance polyamides from EMS-Grivory for various applications – and has now presented the Swiss supplier with its award for the fifth time in a row, recognising the outstanding service provided by the polyamide specialist.

Glazpart

Glazpart has transformed itself over the last 30 years, now offering a unique full service package. Over time capability has been enhanced with a class 10,000 clean room, twin shot moulding and the latest tool room machinery following over £1,000,000 of capital investment.

The team at Glazpart develop new projects from product and tooling design, to injection mould tool manufacture, injection moulding and surface finishing.

Graphite Additive Manufacturing

A brand new functional, laser-sintered material has been developed. Having listened to customers' requests, Graphite Additive Manufacturing has developed the new 'Graphite-SLS' material which gives a desirable black colour and better mechanical properties compared with standard white PA plastic. Crucially, it is lighter than glass filled materials and has superior surface finish.

GSM Graphic Arts

GSM Graphic Arts is a UK manufacturer of industrial labels, nameplates and fascias. At EDS 2015 it will be showing examples of labels and overlays digitally under surface printed using the very latest digital printing technology. These include unique identification plates and barcodes on polycarbonate and anodised aluminium as well as control panel overlays and warning signs. Its under surface digital printing provides a durable hard wearing finish that has been tested for a minimum of five years UV durability and so is suitable for both exterior and interior applications.

GSM Valtech

GSM Valtech will be showcasing its precision sheet metal work and bespoke enclosures. The company manufactures a range of products from sheet metal brackets, busbars and graphic panels to complex sheet metal work, including electronic enclosures, audio mixing and broadcast desks with mechanical assembly. It offers a diverse range of in-house finishes including powder coating, wet painting, screen printing and chromate coating.

HepcoMotion

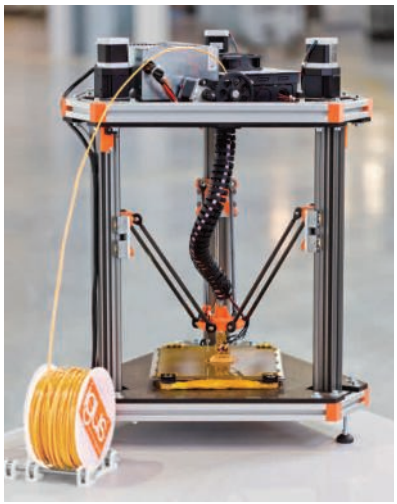
HepcoMotion will showcase its range of products that can meet practically any requirement from linear to circular, and heavy duty to XYZ systems. Key products on the stand include the GV3 superior linear motion system designed to serve a diverse range of automation and linear applications, and the 1-Trak with its ability to achieve 'curvi' linear applications effortlessly.

Visitors can also see Hepco's Heavy Duty Rings demonstrated, suited to applications requiring higher load capacities. Hepco's newest demonstration unit will be on the stand. Visitors can see Hepco's PRT2 1-Trak system being used in conjunction with Beckhoff's XTS circuit linear motor to achieve high speed, high accuracy with high loads. The system also assures a long service life.

Harmonic Drive has built a reputation over the last forty years in developing leading servo actuator and high-precision gearing technology for military, defence, aerospace and robotic applications. At the exhibition, Harmonic Drive will showcase its range of planetary gears, with a particular focus on its HPN planetary gear range. These gears are available in five sizes, with eight gear ratios from three to 31:1 and can transmit repeatable peak torques between nine and 752Nm. With a backlash of five to seven arc minutes, the gear series offers a precision solution for low backlash applications including industrial automation, packaging and continuous production environments.

Haydale

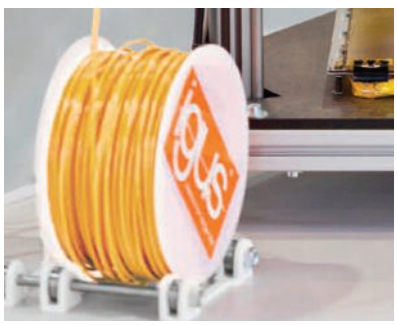
Haydale creates advanced materials for next generation disruptive technologies by facilitating the application of graphenes and other nano-materials in fields such as inks, sensors, energy storage, photovoltaics, composites, paints and coatings. Haydale Composite Solutions Limited (HCS) specialises in the design, development and commercialisation of advanced polymer composite materials on a global basis. HCS spans the entire development cycle from applied research, product design, process development, product testing and certification, to setting up manufacturing plants. HCS also works with OEMs and end-users to develop composite solutions that provide technical, economic and environmental benefits over existing structures currently manufactured in traditional materials.



Igus

Tribopolymer expert igus has developed the world's first structural plastic filament for use in 3D printing. Developed for engineers wishing to create prototype bearings or small batch samples for real-world tests, the new igus tribo-filament is up to 50 times more wear resistant than conventional plastic materials used for 3D printing. Additionally, it is suitable for use with any 3D printer that has a heated nozzle and uses ABS filaments.

Also on the igus stand will be its e-spool cable management system featuring e-spool power. Fitted with a quiet-running electric motor to drive the spool and electronic control system integrated with limit switches, e-spool power makes light work of many applications such as lighting beams and indoor cranes.



KD Feddersen

K.D. Feddersen will be reinforcing its brand by promoting a number of new engineering thermoplastics and processing technologies. These will include;

- Weight saving thermoplastics and technologies for the automotive industry
- Bio Fed - biodegradable and compostable thermoplastics, using sustainable materials
- Thermoplastics designed and developed for the LED lighting industry
- The start-up of its exclusive sales agency for Kautex blow moulding machinery

Merriott Plastics

Comprising of Merriott Plastics, based in Somerset, and ICM (Plastic Moulding) based in Kent, the Merriott Plastics Group is a long-established trade moulder, supplying injection and compression moulded components for a wide range of industries and applications. It is displaying a variety of products, in both Thermoplastic and Thermoset materials that will demonstrate the extent of the company's technical abilities and knowledge.

Jet Press

JET PRESS technical consultants will be on hand at its stand to discuss the extensive JET PRESS product and service capability which includes product design, 3D Printing, 3D CAD models, sampling, manufacturing and stockholding. New products being showcased include Teconnex specialised jointing solutions comprising of V-clamps, band clamps and slip joint assemblies. Also on show will be Band-It products which provide a secure and reliable method of holding tubes, pipes and cabling bundles together.

Materialise

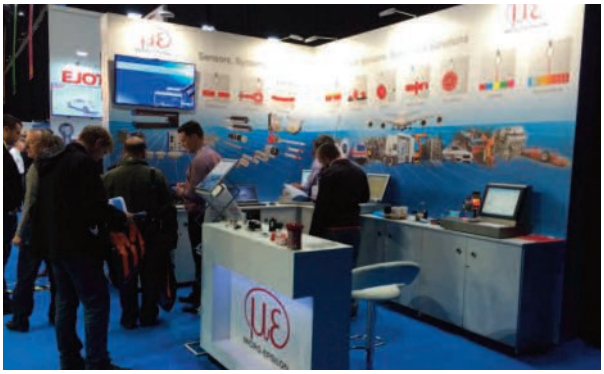
Materialise is introducing its recently launched printing materials and consultancy services at this years' EDS event. Visitors to the stand can discuss requirements for 3D printing, and how to select the right materials and printing process. Also up for discussion will be the company's Co-Creation services, designed to aid those exploring the potential of additive manufacturing, including the 3DP Academy designed to update customer's teams on all things Additive Manufacturing.

Lati

Lati, a producer of technical engineering thermoplastics, works across the development chain from designers to injection moulding companies to assist in the manufacture of plastic parts. Examples of successful projects displayed on the stand will include:

- Heat sinks for LED lights made from thermally conductive polymers
- Self extinguishing plastics for electrical applications
- Glass reinforced compounds used for metal replacement in drinking water applications
- Cable ties manufactured from magnetically detectable plastics

Self lubricating polymers used in industrial automation



Micro-Epsilon

Precision sensor manufacturer Micro-Epsilon UK will be showcasing its full range of sensor technologies. A variety of displacement measurement sensors will be on display, including non-contact capacitive, confocal and inductive LVDT sensors, as well as 2D/3D laser profile sensors, colour recognition sensors, infrared temperature sensors and thermal imaging cameras. The stand will feature numerous interactive product demonstrations, enabling visitors to get hands on with the sensor products to gain a full appreciation of their measurement performance, compactness, ease of use, and integration capabilities.

The capabilities of the high precision, integrated capacitive displacement measuring system – the capaNCDT 6200 – will be demonstrated on the stand by measuring the deflection of granite stone to nanometre accuracy (resolution is down to 0.002µm).

Norelem

Norelem is a manufacturer of precision components both standard and bespoke for automotive, automation, aerospace, medical and industrial markets. It offers specialist solutions and technical service for workholding and clamping requirements and has 30,000 standard components with 98% availability ex stock. There is a 2D and 3D CAD app available for free. download to support design solutions.

Portescap

Portescap is introducing the 22DCP miniature motors, a new generation of Athlonix high power density brush dc motors. The 22DCP delivers, it is claimed, unparalleled power density and speed-torque performance in a cost-efficient package. Features include an optimised self-supporting coil and magnetic circuit, and good speed-to-torque and power. With maximum continuous torque up to 6.5 mNm and a high stall torque, Athlonix 22DCP motors are suited for use in a variety of applications, including medical and industrial pumps, gas analysers, security and access devices and power tools.

Midas Pattern Company

Midas specialises in producing large, low-volume, high-quality, polyurethane mouldings as well as offering customers the facility to create large prototypes - in production materials - in very short timescales.
The large production mouldings are particularly suitable for use as equipment enclosures in medical, analytical and scientific applications, where valuable technology must be enshrouded in large, complex, multi-part moulding assemblies

Misumi

Misumi is a global manufacturer and supplier of more than nine million mechanical components, most of which are individually configurable. The company offers free download of CAD models, deliver from one piece to bulk quantities, and provide a same-day shipment service for 30,000 stock items.

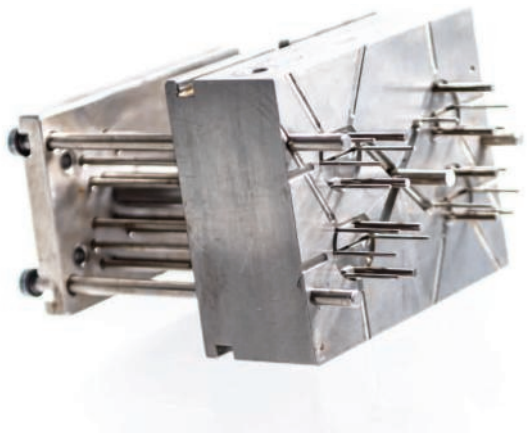
Optimas Solutions

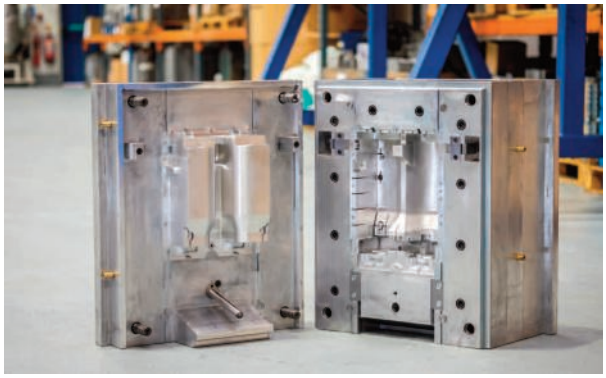
Supplier of 'C'-class components, including fasteners, enclosures, cable management and finishing products, Optimas OE Solutions – Components Division (formerly Anixter Component Solutions) will use EDS 2015 to showcase products from three new suppliers, namely ARaymond Industrial, Stanley Engineered Fastening and Bopla.

Visitors to the stand will be able to see Bopla's Bocube range of screwless and hinged enclosures, the latest range of industrial cable clips and ties from ARaymond, and the new ranges of steel and aluminium rivets to quickly join two or more components from Stanley Engineered Fastening.

Pentagon

Pentagon, a plastic injection moulding business will be highlighting its design assistance and development services and will showcase its development tooling options as the next stage on from rapid prototyping or as a possible alternative. Tooling options allow enhanced material trials for fit and function and can take a project to low volume production. Visitors will also be able to see a range of technical moulding capabilities for repeat production and gain information on the full in-house Toolmaking and Post Moulding services on offer.





RP Technologies

RP Technologies will be showcasing its aluminium tooling and injection moulding capabilities at this years' EDS and invite show visitors to their stand to discuss any upcoming projects. RP Technologies can offer fast turnaround on its services which include complex aluminium prototype tooling, injection moulded components and CNC machined components from its UK based manufacturing facilities.

SD Products

SD Products is a stockist distributor of specialist fasteners, supplying product across all industries. At the show the company will be announcing its official association with ARaymond. Since its inception in 1865, the ARaymond Network has become a world leader in assembly technology with a history marked by defining inventions.

Telsonic

Telsonic engineers have a track record of working with design and manufacturing engineers to assist in defining material selection, joint design, system configuration and process parameters, ultimately reducing risk and the time required to get a new product to market. Applications include plastic welding and metal welding – with linear and torsional options available, plus wire splicing and cut 'n' seal across a wide range of industries.

Rochling

Rochling will introduce a new material with built-in fire protection, Sustamid 6FR - Flame resistant polyamide. The material boasts a very high LOI (Limiting Oxygen Index) of 40% and is halogen free with a UL94-V0 fire rating. In addition the low density (1.17g/cm^3) it provides significant weight and construction benefits in comparison to conventional materials like steel (7.85g/cm^3).

SYS Systems

SYS Systems will demonstrate the advanced capabilities of Stratasys 3D printing and additive manufacturing systems at EDS. On display will be its cost effective, range of 3D printing systems. These compact systems combine the accuracy and versatility of high-end rapid prototyping machines within a small footprint.

Technotrans

technotrans has a background in temperature control, filtration, inking systems and water treatment for the printing industry. However, it is outside that sector in broader engineering applications that it is seeing the greatest growth (about 30% per annum). Projects in recent months have included mechanical and plant engineering, battery cooling and medical and scanner applications.

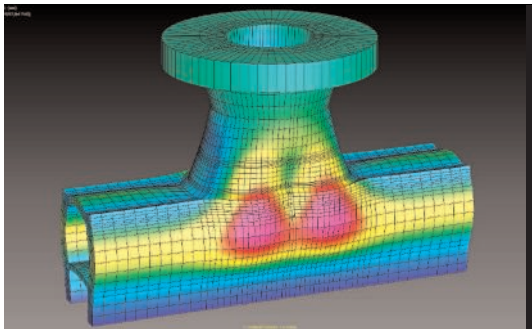
On the stand at the EDS technotrans will show an intelligent thermal compression device for medical and sports applications and particularly the healing or prevention of muscle, ligament and other soft tissue injuries developed with their customer Physiolab, who are now working alongside top class football clubs, including several premiership teams.

Tesa

tesa will showcase a core range of double sided adhesive tapes including tesa ACXplus. This offers a viable alternative to traditional mechanical fastening for constructive bonding, offering significant advantages which can be seen in its bonding strength, stress dissipation and resistance to the elements. Visitors will also have the chance to see other products within the tesa range, including heat activated film and laser labels for tamper evident security marking.

TFC

TFC offers design engineers the opportunity to move their product designs to the next level with its range of space saving Smalley Crest-to-Crest flat wire Wave Springs and Spirolox edge wound Retaining Rings. TFC will be demonstrating how these products can offer sizeable cost savings in the manufacture of a wide range of mechanical products.



Strand7

At EDS Strand7 will be previewing the upcoming release of its finite element analysis software; this is a major new release, which will be available in the coming months.

Strand7 software is a general-purpose FEA system designed specifically for Windows. It comprises pre-processing, post-processing and solver functionality in a single integrated application. Strand7 is used for linear and nonlinear analysis of structures and components (static, dynamic and heat transfer), and is well suited to companies of all sizes. Strand7 is seamlessly integrated to Windows and offers strong connectivity to other applications via the Windows clipboard and through support for industry standard format such as IGES, STEP, SAT, STL and DXF.

Thermal Issues

Thermal Issues now offers an exclusive Managed Inventory Service to simplify the supply of bespoke thermal interface material parts it manufactures for customers. These include all its custom-produced profiles in thermally conductive, electrically isolating or anti-vibration materials. The bespoke nature of application-specific shapes makes short-notice manufacturing or fast-turn supply difficult, if not impossible. Instead, Thermal Issues takes a 3, 6 or 12-month order from the customer and manufactures the parts for stock immediately. Thermal Issues offers accuracies down to 20 microns across a range of materials from the world's top manufacturers.

Unite

The focus for Unite Automation, is to offer the existing machine building sector a comprehensive range of vibratory parts feeding equipment, developed for the assembly automation market. The hardware is sourced from Germany and includes bowl feeders, linear feeders, conveyors and hoppers, the basic elements of most parts feeding systems. As the UK & Ireland sole agent for Grimm, Unite Automation has achieved rapid growth in this market, supported by a network of automation associates, based in the UK.

Exhibitor list

3D Generation
42 Technology
AAV Plastics
ABSSAC
Acorn Industrial Services
Agentdraw
Air Engineering Controls
Assembled Electronic Solutions
Beckhoff Automation
Biesterfeld Petroplas
Cambridge Consultants
Ceema Technology
CeraCon
Coba Precision Engineering
Cotsworld Plastics
Counterplas
Creasefield
CREAT3D
Curtiss-Wright Surface Technologies
EJOT UK
Electro Mechanical Systems
Elesa (UK)
EMS Chemie UK
EPLAN
European Springs & Pressings
GGB
Gill Research & Development
Glazpart
Goodfellow Cambridge
Graphite Additive Manufacturing
GSM Graphic Arts
Hagiwara Solutions
Harmonic Drive
Haydale
Heason Technology
HEIDENHAIN
Henkel
HepcoMotion
High Speed Two (HS2)
HK 3D Printing
igus
IKO Nippon Thompson
Infolytica Europe
Institution of Engineering Designers
Jet Press
K.D. Feddersen UK
KEYENCE UK
KNF Neuberger UK
Laser Lines
LATI UK
Lee Spring
LG Motion
Licharz
Lynch Motor Company
Majenta PLM
Materialise
maxon motor UK
McLennan Servo Supplies
Merriott Plastics Group
Micro-Epsilon UK
Micronel UK
Midas Pattern Company
MiniTec UK
MISUMI Europa GmbH
norelem
Nylacast
Optimas OE Solutions
Optris
Partner Electronics
PD Components
Pentagon Plastics
PFK Shurlok
Portescap
Product Assessment & Reliability Centre (PARC)
Proto Labs
RDP Electronics
Reliance Precision
Röchling Engineering Plastics
RP Technologies
RUD Chains
Rutland Plastics
SD Products
Smallfry
Space Claim
STOCKO CONTACT
StrainSense
Strand7
SUSPA UK
SYS Systems
Techni Measure
Technosoft Engineering Projects
Technotrans Graphics
Telegartner UK
Telsonic UK
tesa UK
TFC
Tharsus
Thermal Issues
Tiro Associates
Trotec Laser
Unite Automation
WDS
WITTENSTEIN
WS2 Coatings

Trotec

To complement its range of laser machines, Trotec has recently announced the launch of its specialist engraving materials range. Boasting a wide selection of laminates, the range is perfect for engravers and sign makers whether laser or rotary engraving. The new durable sheet material offers efficient engraving with fewer passes, produces no sticky edges after laser cutting and requires minimal post production cleaning due to reduced residue produced during engraving.

Trotec Laser will also reveal a laser engraver, the Speedy 360 at this year's EDS. Created with a 32" x 20" (813 x 508mm) bedsize, designed to maximise the material usage of standard sheet sizes, this mid size laser engraver boasts a top speed of 3.55m/sec whilst ensuring the highest level of accuracy.

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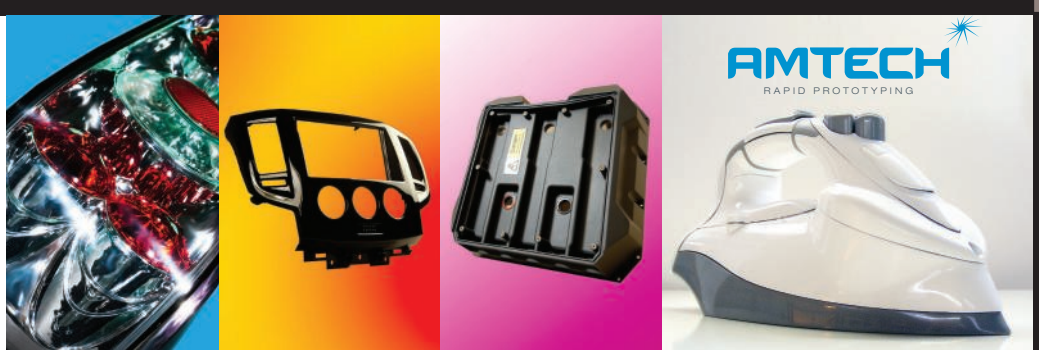
- Model Finishing.



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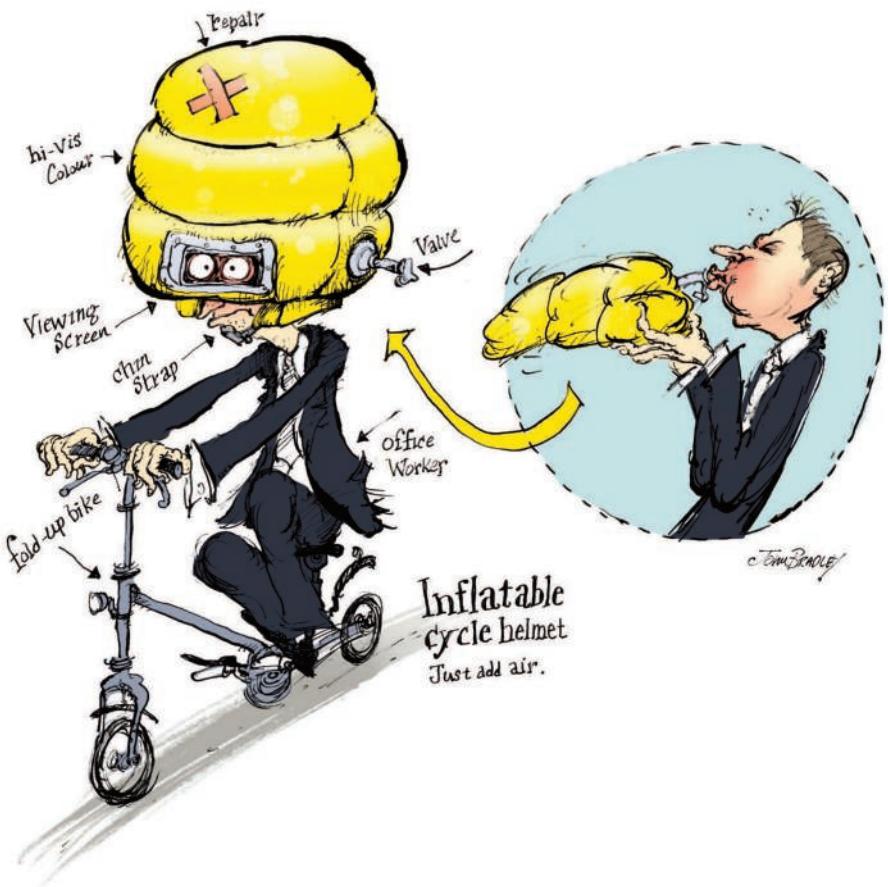
Safety that isn't hot air

We have already noticed that an uncanny number of Eureka readers' ears pick up at the mention of cycling. While there is clearly a cycling resurgence within the UK, possibly led by Olympic and Tour de France success, it seems the enthusiasm for the sport amongst engineers is disproportionately high. Is this because many modern-day engineers are harnessed to their desks all day and need a good leg stretch, or perhaps it is elegance of the design of contemporary bikes with their marriage of advanced mechanics and even more advanced materials. Or perhaps it is the practicality of a mode of transport that keeps you active, is cheap and is non-detrimental to the environment.

But is it always all that practical? It seems bikes can be folded (and conveniently carried) to little more than the size of the cycle helmet, which is fine but you still have a bike helmet that is the size of..er.. a bike helmet.

If you are one of those commuters who combine train and cycle journeys, the helmet needs to be carried around even if the bike is left padlocked in a suburban station. Here are some interesting survey results: 92% of cyclists don't wear a helmet. 84% believe their lives are at risk if they don't wear a helmet. 83% don't wear a helmet because of portability.



The challenge

So this month's challenge is to come up with a safety device that cyclists will use and is portable. The over-riding concern here is that the solution provides protection that is at least equivalent to a standard cycle helmet. Equally it needs to be substantially more portable if it is to have an impact and also this is a price sensitive part of the market – a Bill of Materials running into thousands is not likely to be a best seller.

As always we have a solution in mind which will be published in next month's issue, but if you have any entertaining or interesting solutions then feel free to leave a comment on the Coffee Time Challenge section of the website or email the editor at tfryer@findlay.co.uk.

The answer to last month's Coffee Time Challenge, how to provide a constant source of light to people without access to electricity (or money), can be found on page 11 of this issue.

jbj TECHNIQUES LIMITED

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All Steel Gear Couplings

Gear couplings have the highest power density, offer more variations, a wider size, torque, and bore capacity than any other coupling type. They are easily modified for shear pin service, floating shaft type, vertical applications, electrical isolation, limited end float, and can have a brake drum or disc added. While some features may be available on other couplings, it is typically easier and cost effective to modify a gear coupling. With all these advantages, the gear coupling is used on more applications versus the nearest competing coupling type.

Gear couplings achieve their misalignment capability through backlash in the teeth, crowning on the tooth surfaces, and a major diameter fit. Backlash is the looseness-of-fit that results from gear teeth being narrower than the gaps between the teeth. In addition to contributing to the misalignment capabilities, the backlash provides space for the lubricant. The loose fit provides misalignment capability by allowing the sleeve to shift off-axis without binding against the hub teeth. Crowning, or curving the surface of the hub teeth, further enhances this capability. The crowning can include tip crowns, flank crowns, and chamfers on the sharp edges. This also helps improve tooth life by broadening the contact area along the "pitch line" (where the gear teeth mate and transfer torque), thereby reducing the pressure of torque forces. In addition, it prevents the sharp squared edges of the tooth from digging in and locking the coupling. Variable Crowning, which varies the curvature radius along the tooth flank, maintains greater contact area between teeth during misalignment compared with standard crowning, and reduces those stresses that cause wear. Note that crowning applies to hub teeth only; sleeve teeth are straight except for a chamfer on the minor diameter edge.

While the hub and sleeve teeth are cut to fit loosely side to side, they fit closely where the tip diameter of the hub teeth meet the root diameter of the gaps between the sleeve teeth. That is called a major diameter fit. Minor diameter fits (where the tips of the sleeve teeth meet the root diameter of the hub teeth) are purposely avoided, because a close fit would prevent suitable misalignment and torque transmission capability.

Gear couplings use the AGMA standard naming convention to specify the size of the coupling starting at size 1 and increasing to size 30; with a corresponding increase in size (a flanged size 1 gear coupling is approximately 114.3 mm diameter while a flange size 30 gear coupling can approach 1981.2 mm in diameter). AGMA specifies that flange gear couplings from size 1 to size 9 will match up half for half with other flange type gear couplings made to the AGMA standard dimensions. However, while the dimensional standard ensures compatibility of the face to face match between sleeve flanges, it does not assure matching torque or bore capacity.

Gear couplings are power intensive. That means more torque is transmitted per coupling mass and space consumed than other coupling types. The resulting relatively small size of the gear coupling allows the addition of attachments without having the coupling grow to excessive proportions.

To differentiate the new gear coupling in the marketplace, Lovejoy introduced the HercuFlex trademark to signify the increased capabilities. With increase torque and bore capacity combined with a robust design that increases service life, the HercuFlex coupling gives the customer the ultimate choice. Use the increased capacities to maximize the abilities of the system or downsize the coupling to gain a cost reduction without sacrificing performance.

Contact the jbj Techniques technical office for further information.

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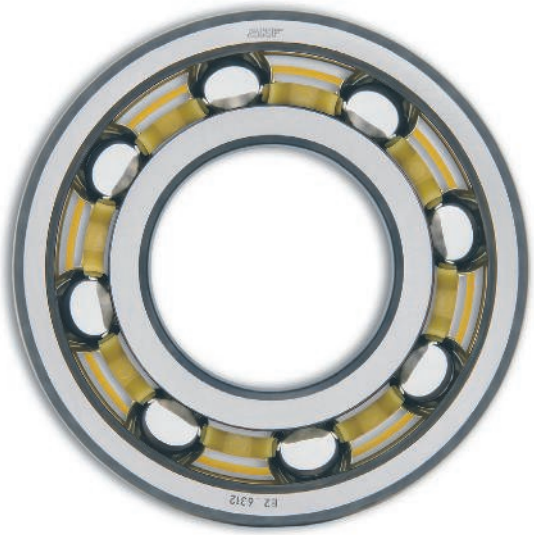

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- Y-bearings

SKF Energy Efficient (E2) bearings

Every once in a while, a product innovation comes along that holds the potential for huge global benefits. You already know about energy efficient light bulbs; now discover the possibilities of SKF Energy Efficient bearings.

These ultra-low friction bearings consume a minimum of 30% less energy than the already efficient standard SKF bearings. Compared to other bearing brands the energy reduction can be even more dramatic.

SKF Energy Efficient bearings can also last up to twice as long in applications with light-to-normal loads. And in many cases, they run cooler at equivalent loads and speeds, reducing lubricant use and potentially extending equipment life.

Make a small change, make a big difference. Replace your conventional bearings with ultra-low friction SKF Energy Efficient bearings.

www.skf.co.uk/E2

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