www.eurekamagazine.co.uk September 2016

EUREKA

THE MAGAZINE FOR ENGINEERING DESIGN

In this issue: Industry 4.0 • Topology Optimisation • Aerospace • Engineering Design Show Preview

AUTONOMY IN THE UK

Can Britain lead the driverless car revolution?


ELECTRONICS DESIGN SHOW
ENGINEERING DESIGN SHOW
EMBEDDED DESIGN SHOW
19 - 20 OCTOBER 2016
RICOH ARENA | COVENTRY
"See Learn and Participate"
"GREAT Technical Content"
"Learn things NOT seen on the Internet"
"Best Show of the YEAR!"
Discover what these design engineers already know...
WWW.ENGINEERINGDESIGNSHOW.CO.UK

EUREKA

THE MAGAZINE FOR ENGINEERING DESIGN

In this issue: Industry 4.0 • Topology Optimisation • Aerospace • Engineering Design Show Preview

AUTONOMY IN THE UK

Can Britain lead the driverless car revolution?

What You Need, Find It Here!

- DATA SHEETS
- APPLICATION NOTES
- ARTICLES
- NEW PRODUCTS
- TECHNICAL/SOLUTION GUIDES
- CIRCUIT BLOCK DIAGRAMS
- REFERENCE DESIGNS
- SYMBOLS AND FOOTPRINTS
- PART SEARCH
- DEVELOPMENT KITS
- EVALUATION BOARDS
- TECHNICAL SUPPORT OR CHAT
- PRODUCT TRAINING MODULES

0800 587 0991 • 0800 904 7786

DIGIKEY.CO.UK

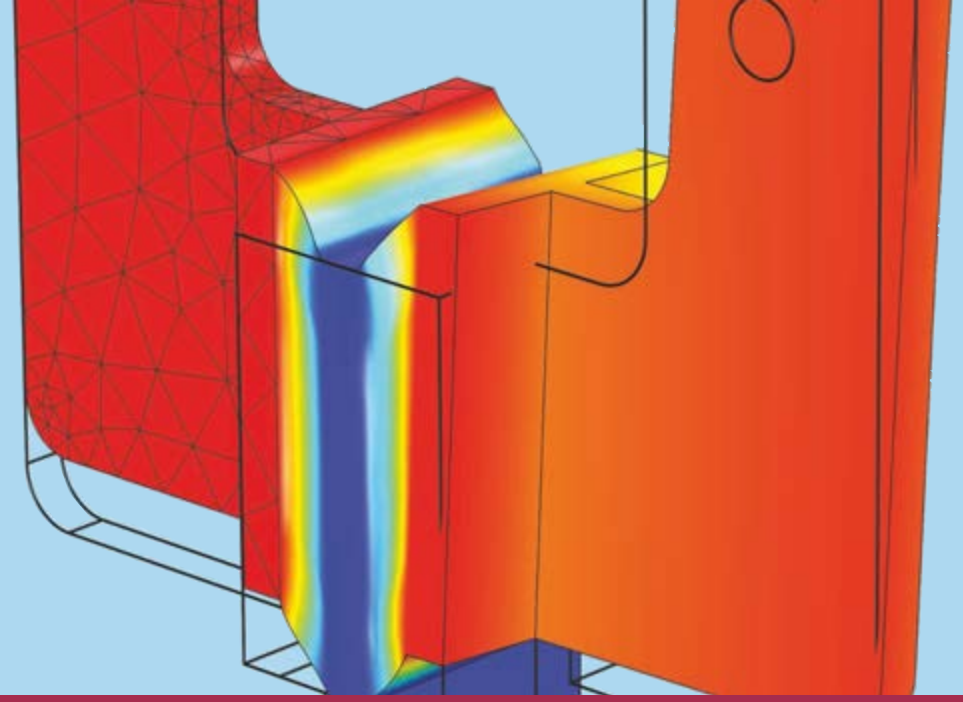
Digi-Key® ELECTRONICS

5 MILLION PARTS ONLINE | 650+ INDUSTRY-LEADING SUPPLIERS | 100% AUTHORIZED DISTRIBUTOR

*A shipping charge of £12.00 will be billed on all orders of less than £50.00. All orders are shipped via UPS for delivery within 1-3 days (dependent on final destination). No handling fees. All prices are in British pound sterling and include duties. If excessive weight or unique circumstances require deviation from this charge, customers will be contacted prior to shipping order. Digi-Key is an authorized distributor for all supplier partners. New product added daily.

CONTENTS

September 2016 Volume 36 Number 9



MULTIPHYSICS FOR EVERYONE

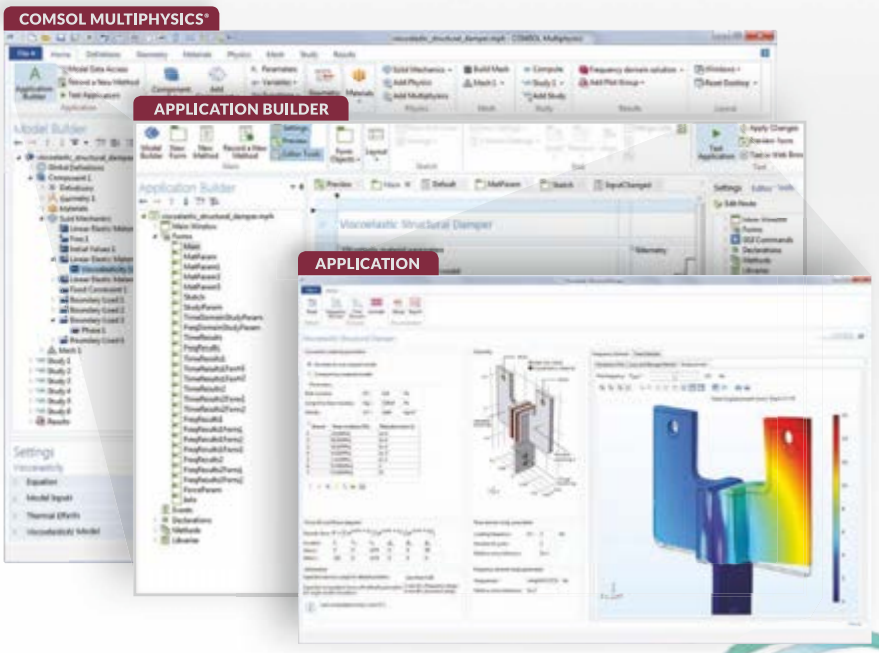
The evolution of computational tools for numerical simulation of physics-based systems has reached a major milestone.

Custom applications are now being developed by simulation specialists using the Application Builder in COMSOL Multiphysics®.

With a local installation of COMSOL Server™, applications can be deployed within an entire organization and accessed worldwide.

Make your organization truly benefit from the power of analysis.

comsol.com/application-builder



COMSOL

Editor
Tim Fryer
tim.fryer@markallengroup.com

Technical Editor
Justin Cunningham
justin.cunningham@markallengroup.com

Editorial Assistant
Tom Austin-Morgan
tom.austin-morgan@markallengroup.com

Group Editor
Graham Pitcher
graham.pitcher@markallengroup.com

Art Editor
Chris Charles

Advertising Sales
01322 221144

Sales Manager
Jez Walters
jez.walters@markallengroup.com

Regional Sales Manager (Northern)
Simon Bonell
simon.bonell@markallengroup.com

Sales Executive
Christian Kostadinov
christian.kostadinov@markallengroup.com

Production
Heather Upton
heather.upton@markallengroup.com

Circulation Manager
Chris Jones
chris.jones@markallengroup.com

Publisher
Luke Webster
luke.webster@markallengroup.com

SSN-0261-2097 (Print)
ISSN 2049-2324 (Online)

Eureka (incorporating Engineering Materials and Design and Design News) is free to individuals who fulfil the publisher's criteria. Annual subscriptions are £81 UK (£118 overseas or £153 airmail).

Eureka is published by
MA Business,
Hawley Mill, Hawley Road, Dartford, Kent,
DA2 7TJ Tel: 01322 221144
www.eurekamagazine.co.uk

Moving on?
If you change jobs or your company moves to a new location, please contact **circulation@markallengroup.com** to continue receiving your free copy of Eureka.

MA BUSINESS
A MARK ALLEN GROUP COMPANY
www.markallengroup.com

The A-bomb has landed

Tim Fryer, Editor (tim.fryer@markallengroup.com)

On A-level results day last month, tens of thousands of school leavers discovered what their first formal step up the ladder to a career in engineering was going to be. Research just released from the Institute for Fiscal Studies indicates that a degree is still worth it.

When the fortunes of students from the 80s were compared to those from the 90s, it showed graduate job numbers increased and the pay differential compared to non graduates was maintained, despite a doubling in student numbers at the time. Since then, however, student numbers have increased by a further 170,000 to 424,000 university places being offered in 2016. At some point, surely, this is going to stop paying dividends, both for the country and the individual. If looked at as one collective body, it seems inevitable that the degree label will be devalued and improved salaries will not counter tuition fee-related debts.

If such a trend emerges, will engineering students be resilient to it? The number of graduates produced in engineering still hovers below 50,000, at a time when industry claim twice that number are needed to provide growth and replenish stocks from an aging workforce. The number of engineering applicants, however, remains static.

So why is this? Schoolchildren are clearly happy enough with the idea of being students and are not put off by consequential indebtedness. Equally, the Government continues to support apprenticeships, which can be a great way for companies to train the staff they need and for budding engineers to enter the industry and get qualifications, including degrees, while getting paid and gaining experience.

The simple answer, I unfortunately believe, is that engineering is not easy. I'm not saying that arts or humanities are easy, but there is little responsibility in such disciplines. An engineer needs to know his or her stuff, because they will be designing or making things in the future – things that they are responsible for and that must work – and it takes graft to get to there.

That graft includes doing engineering related subjects at school – maths, physics and design technology – which are also not easy, but 2016 results show that numbers in all three (i.e. those that passed A-levels) are down.

Fortunately, the 50,000 strong student intake understands this and they understand it is part of the joy of creating engineering solutions. Sadly there may be another 50,000 or more out there who don't. Is that their fault? Or are we as an industry still struggling to communicate the message to school children that engineering is invaluable and enjoyable?

Prototyping firm helps Honda with its push towards driverless technology

Ogle creates models for innovative 'Honda. Great journey.' campaign

When Honda wanted to showcase its exceptional technological advancements and capabilities in designing vehicles for a multitude of environments, the notion of 'Honda. Great Journey.' was born. Ogle has produced seven concept vehicles that could retrace the world's longest route of human migration from Nairobi, Kenya to Manaus, Brazil. Map and Mori Inc. were commissioned by Honda to develop the series of designs which would ultimately present the brand's future vision for autonomous driving technology in a context which had not previously been explored. The vehicles needed to travel across a variety of terrains; from valleys to mountains, road to sea and snow to desert. They would be used as part of an advertising video developed by Map and Mori Inc.

The challenge

Each model required precise production and finishing to correctly represent the high quality and ingenuity of a Honda vehicle.

The CAD models were designed to be full size before being scaled down to 1:24. Ogle focused on maintaining the strength of each part after it has been scaled down and working closely with Map to develop practical solutions. The subsequent manipulation of the CAD data created a high volume of parts that needed to be tracked throughout each stage of production.

The accuracy demanded by the machines at Ogle was significant. To achieve the required finishes and component parts of the models, there was no room for error. A considerable amount of time was spent both in design and on the bench to create clearances for paint so that everything could be assembled perfectly after the parts had been painted.

Ogle's paint team were tasked with delivering finishes that had never been created before, and providing the client, Map, with samples that could be signed-off before the models were painted.

Solution

SLA was the only viable process to deliver precise accuracy of the parts. This process also delivers a superior surface finish, which was vital to this project in reducing excessive handling of the vehicles. The levels of accuracy Ogle achieve can meet +/-0.1mm per 100mm. So that the project met lead times, Ogle used all four of their SLA machines; the iPro for larger parts, the two Vipers and 3500 for the smaller more intricate details.

After the models were scaled down to 1:24, some of the details that would have been produced using SLA were now impossible. To create some of the very thin rope details, the model makers at Ogle hand-formed stainless steel and copper wire to give more of a robust and realistic effect.

Once all the parts had been produced, the model makers began the rigorous task of preparing the individual components for the paint department. This process included applying a guide coat to each of the models to ensure that all the items were rubbed down correctly, and then the model was sandblasted to even all the surfaces and soften any remaining layers from the SLA process.

In the final assembly, all parts were tested to allow for the required movement within each vehicle. The Mountain Climber and Jungle Jumper went through further inspection because large elements were functional and needed to move, so the overall balance and strength of the model had to be tested and maintained.

Conclusion

Ogle are extremely proud to have been selected to produce such intricate and unique models and was keen to obtain feedback. Scott Barwick, Design Associate at Map and Mori Inc., said: "We initially selected Ogle due to their competitive price and the fact that they could meet our strict lead times. We had thought about outsourcing the project to China, but the great thing about Ogle is we could visit them, have a conversation directly with the team and resolve issues very quickly.

"We really enjoyed working with the team at Ogle, their professionalism, the quality and overall experience was superb. One of the great things about Ogle is their technology, and the precision of their machines, which can be seen clearly in the seven models. This has been our first experience of working with Ogle and we can't recommend them highly enough. I am sure we will work together on future projects."

ogle MODELS + PROTOTYPES

NEWS

Clear view of apprenticeships

Semta has welcomed the publication of Government plans for the Apprenticeship Levy. The not-for-profit employer-led organisation had been calling for clarity and further detail to help businesses large and small ensure that they are ready to embrace the changes.

Ann Watson, CEO of Semta said: "There is much to be welcomed by our sector. The successful introduction of the Apprenticeship Levy is now absolutely vital to the future of our sector and our nation – Semta is totally committed to help make this happen.

"The transferability of levy funds to other employers and the full funding by Government of younger apprentices taken on by small employers are particularly pleasing.

"Over £350 million a year is spent on apprenticeships in our sector, 25% of the total. It's crucial that employers are able to maintain this level of investment in their skills, so we welcome the generous 90% co-investment proposed by the Government and the uplift for STEM apprenticeships."

EU's fast track to innovation

The European Commission is awarding €32 million to bring innovative ideas to market quicker. The 15 benefiting projects, involving 70 partners in 19 countries, will receive around €2 million each under the fifth round of the Fast Track to Innovation (FTI) scheme run under the EU's research and innovation programme Horizon 2020.

The range of projects include those focused on development of composite material technology for aircrafts, electrode lead technology for cardiac diseases, vineyard robots, sustainable pre-fabricated glass facades and a new treatment for peripheral arterial disease.

In order to fast-track projects under the FTI scheme, the time between application and getting a grant agreement signed is capped at six months. Furthermore, the pilot is implemented through one common and continuously open call, meaning that proposals can be submitted at any time.

Carlos Moedas, Commissioner for Research, Science and Innovation, said: "Supporting innovation as a source of growth and job creation is at the core of Horizon 2020. Today we are giving top innovative businesses a head start in the race to market by providing faster access to €32 million in EU funding."

The next cut-off – on 25 October 2016 – is the last of the pilot FTI scheme.

Events

20 - 21 September
Exploring the intersection of design & technology: Converge Conference Series - Europe
Essen, Germany

21 - 23 September
Experience Composites - powered by JEC 2016
Augsburg, Germany

27 September
National Instruments Hands-on Taster
NI HQ, Newbury

28 - 30 September
Additive Manufacturing for Defence & Aerospace
Washington D.C.

28 September
The Wiltshire Festival of Engineering
Olympiad Leisure Centre, Chippenham

28 - 29 September
TCT Show + Personalize
NEC, Birmingham

4 - 5 October
3D PRINT 2016
Lyon Eurexpo, France

6 October
British Engineering Excellence Awards
HAC, London
BEEAs winners are announced for 2016

19-20 October
Engineering Design Show
Electronics Design Show
Embedded Design Show
Ricoh Arena, Coventry
The UK's main event – exhibition, conference and workshops – for design engineers.

NEWS

Winning women innovate for the IoT

Three young women engineers have been recognised by Bosch for their visions of how the Internet of Things (IoT) might transform the way we live our lives. Maz Chowdhury, Sophie Spooner and Ka Man Wong were chosen as the winners of a competition that sought the best new applications of the IoT.

The competition formed part of Bosch's #BetweenUsWeCan campaign, which supports efforts to improve gender diversity within engineering.

Steffen Hoffmann, president of Bosch in the UK, said: "At a time of chronic skill shortages within engineering, the competition provided a platform for women to demonstrate the ambition to solve problems and ideas to change the world. We challenged the brightest young female engineers to think about how the IoT might transform our lives, and they certainly delivered."

Maz Chowdhury, a chemical engineering student from the University of Surrey, devised a garden watering and irrigation system that was linked to ground-based sensors to ensure that lawns and plants would receive exactly the right amount of water they needed.

Sophie Spooner, studying communications engineering at Aston University in Birmingham, imagined the use of front and rear window-mounted micro-cameras that could record video footage in the wake of

unauthorised entry into a vehicle. The security system could send the images to the car owner's smartphone.

Meanwhile, Ka Man Wong, an engineering student at the University of Bath, envisaged a multi-sensory recycling container that could classify the type of waste that consumers were recycling, employing a points-based incentivisation scheme to reward them accordingly.

Triumph goes for speed record on US salt flats

UK motorbike manufacturer, Triumph, has reached its fastest ever speed bringing it a step closer to achieving the world record.

The Triumph Infor Rocket Streamliner has become the world's fastest Triumph after reaching 274.2mph on the Bonneville Salt Flats. The 'bike' was piloted by racer Guy Martin, who broke the previous record of 245.6mph.

The bike had been heavily customised for the run, including a streamlined carbon Kevlar monocoque surround and two turbocharged Triumph Rocket III engines totalling 2970cc to produce a combined 1000+bhp.

This record brings the bike manufacturer a step closer to Triumph's and Martin's ultimate goal of breaking the world two wheeled land speed record of 376.4mph. Triumph put a team together including aerodynamic engineer Matt Markstaller and engine builder Bob Carpenter with the goal of a 400mph plus record-breaking run.

Concerns over the future of UK engineering

This year's GCSE results have shown a 26% increase in pupils retaking maths to reach grade C or above, as well as a fall in the number of pupils achieving a pass mark in Physics and Design and Technology. This has led to a call for grassroots change to encourage young people into engineering.

The Institution of Engineering and Technology (IET) also says that the pressure for schools to adopt the English Baccalaureate (EBacc) could effectively mean that schools drop 'non-core' subjects such as Design and Technology from the syllabus. Stephanie Fernandes, IET principal policy advisor of education and skills, said: "Given engineering currently accounts for 27% of our total GDP, and we are expecting a shortfall of 1.82million new engineers over the next decade, removing subjects like D&T from the curriculum is incredibly short sighted."

Today's exam results highlights an issue confirmed by a recent OECD study. The study suggests school performance in the UK could be boosted by improving confidence - among girls especially - towards tackling maths and science, and by parents encouraging their children to consider careers involving subjects such as engineering.

Kieron Salter, managing director of KW Special Projects, said: "With only 8% of roles within the industry held by women, there's huge untapped potential here."

THE NEW PGN-plus Universal Gripper

Now with Permanent Lubrication

A Class of its Own!

NEW: Up to 50% longer gripper fingers
The higher maximum moments of the improved SCHUNK multi-tooth guidance enable use of longer gripper fingers.

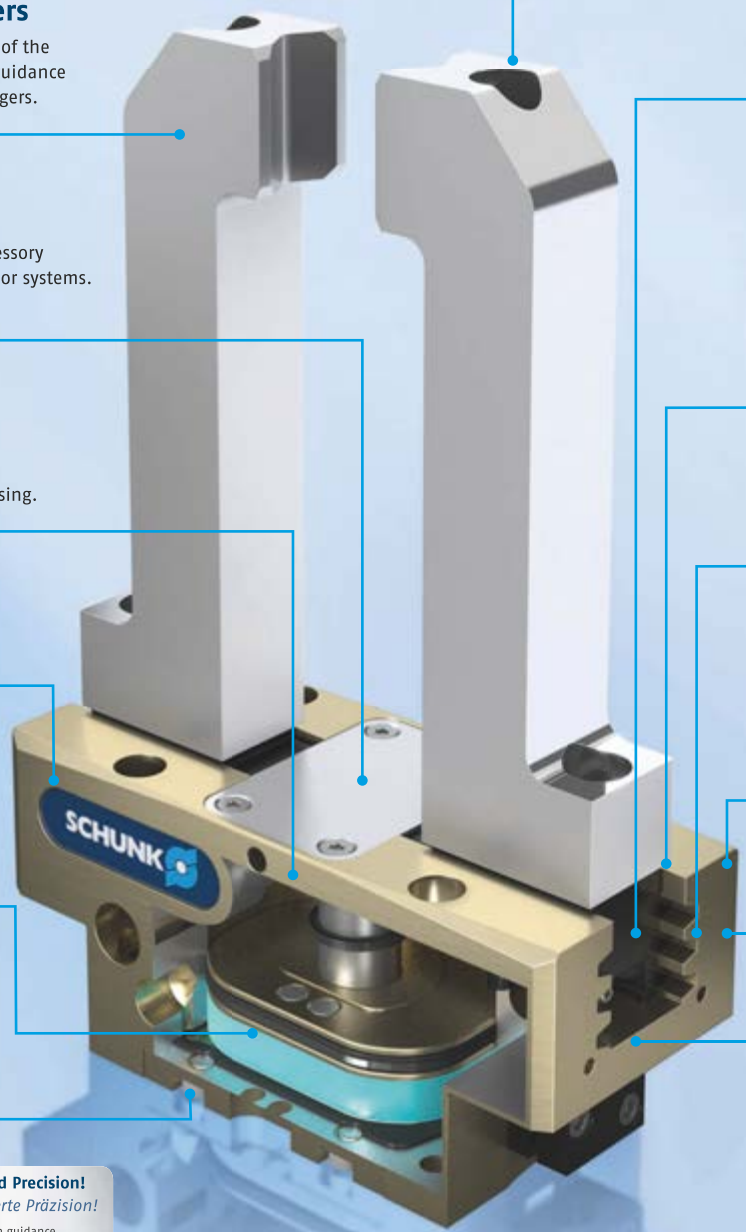
Diverse accessories
Wide range of high-quality accessory components and matching sensor systems.

2 positions for sensor installation
Optimally integrated in the housing.

Made in Germany
In the city of Brackenheim, home of Theodor Heuss.

NEW: Up to 50% higher gripping force
With the enlarged surface of the drive piston.

3 mounting options
Three screw directions on two gripper sides.



Up to 21,800 N of gripping force

NEW: Maximum reliable performance with up to 60% larger angled surface
Larger angled surface and therefore lower surface pressure for low-wear transmission of forces to the base jaw for a reliable process.

Design with optimized interfering contours
Ideal for use in confined spaces.

NEW: Lifelong maintenance-free
The SCHUNK multi-tooth guidance with continuous grease pockets ensure even, permanent lubrication.

2,120 variations
To meet every requirement.

55 stroke variants

Workpiece weight of up to 80 kg

Patented Precision!
Patentierte Präzision!
Multi-tooth guidance
Vielzahnführung

www.gb.schunk.com/pgn-plus

1945 – 2015
70 Years

Superior Clamping and Gripping

SCHUNK®

NEWS

Survey reveals virtual progress

The Business Advantage Group has announced details from its Worldwide CAD Trends 2016 Survey, specific to current and predicted augmented/virtual reality use. The survey results are based on responses from CAD users, designers, engineers and managers.

Chris Turner, CEO of Business Advantage Group commented: "We see augmented reality (AR) as a spectrum with pure reality at one end and wholly virtual reality (VR) at the other end. Currently for CAD users, managers and executives this trend has low current usage and importance, but very strong future growth potential is predicted by survey respondents."

The augmented/virtual reality trend is ranked 11th most important of the 15 trends CAD trends surveyed but its importance is increasing - from 4.5 to 4.9 (out of 10) between late 2014 and late 2015. In the same period awareness of the technology increased, from 18% to 22%, and usage also increased, from 3% to 5%. In terms of users, about 1 in 20 CAD users are using AR/VR technology and this applies across all industry sectors, company sizes and geographic regions. However, CAD users are predicting fast growth albeit from a low base – 60% this year (from 5% to 8% Usage) and 140% within 5 years (from 5% to 12% Usage).

TECH BRIEF

Valves drive Industry 4.0

Festo has embedded OPC Unified Architecture (OPC-UA) into its valve terminals, enabling engineers to realise the benefits of smart manufacturing and Industry 4.0 principles. The valve terminals, which control factory and process automation and combine fluid and motion control, can now be embedded in any Industry 4.0 host environment. OPC-UA is an industrial machine-to-machine communication protocol for interoperability.

"As we move towards Industry 4.0, communication and engineering standards are absolutely critical. The vision of IoT can only be realised if the communication of the central components is based on a common standard that can fulfil its complex requirements," said Steve Sands, product manager at Festo. "As OPC-UA is platform and operating system independent, it can provide an open communication solution from the front-end devices, sensors and actuators, or controllers right up to the cloud.

Solution to last month's Coffee Time Challenge

SPONSORED BY MICRO EPSILON

The solution to last month's challenge about how to create a better earplug comes from Kickstarter company Flare Audio with its Isolate product. It claims that these allow people to 'switch off their ears', isolating them from the sonic symposium outside.

It certainly placed a huge importance on material choice, avoiding the normal polyurethane foam and replacing it with aerospace grade aluminium, and also a denser titanium for those that need complete attenuation.

Flare Audio said that while solid metal is a good conductor, it needs a direct connection to act as such. It said its ISOLATE technology works by using a dense material, in this case a metal, suspended in a soft memory foam to isolate it from the effects of sound conduction. The result, it claimed, is total direct noise isolation.

"When you isolate a small piece of metal or dense material in soft foam inside your ear, sound waves can't penetrate the flexible medium of air and it becomes the perfect isolator," said Flare Audio's founder and inventor, Davies Roberts. "Understanding this principle is what inspired us to develop the perfect ear plug."

The Isolate earplugs were originally designed for loud music gigs, enabling a reduction in overall volume while keeping frequencies at the same level, however, its uses as a better earplug are ubiquitous.

ISOLATE will go on general sale later this year.

World's first car with graphene panels

BAC has partnered with Haydale Composite Solutions to become, it claims, the first manufacturer in the world to develop a car featuring panels made from graphene. The rear wheel arches are made out of the innovative and lightweight material.

BAC chose to test the use of graphene on the rear wheel arches of the BAC Mono, the company's road-legal supercar, due to the size and complexity of the part, to thoroughly test the manufacturing process and how the material fitted in with the car.

BAC development director and co-founder Neill Briggs commented: "Making significant weight savings and improving body strength will allow us to offer improved performance to our customers. This is the latest in a line of ground-breaking innovations on the Mono, and we were delighted to have worked with Haydale, on this exciting project."

SOLIDWORKS

SOLIDWORKS 2017

THE POWER YOU NEED TO DRIVE INNOVATION

Discover the new enhancements in SOLIDWORKS 2017 at one of our regional launch events...

www.solidsolutions.co.uk/sw2017

SOLIDSOLUTIONS
SUPPORTING EXCELLENCE

01926 333777

DELL | NVIDIA

NEWS

Products

For the full story, visit the Eureka website and in the search engine enter any of the numbers below.

Sectional mobile valves offer versatility
143,538

High definition thermal inspection camera
143,543

Self-cleaning analysis system
143,881

Delta Couplings for mobile plant applications
143,929

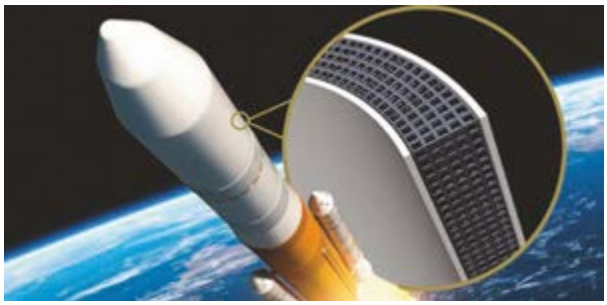
Gas detection alarm and controller
143,120

Stainless steel filter regulator range
143,129

One-Touch away from simplicity
143,245

High-load ball screw support bearings
143,444

3D printed lattice provides rocket support



Researchers at ETH Zurich have developed a three-dimensional lattice structure capable of absorbing vibrations while also acting as a load-bearing component – for example, in propellers, wind turbine rotors and rockets.

Led by Chiara Daraio, professor of mechanics and materials, the researchers made the structure, which has a lattice spacing of around 3.5mm, out of plastic using a 3D printer. Inside the lattice they embedded steel cubes that act as resonators.

"Instead of the vibrations travelling through the whole structure, they are trapped by the steel cubes and the inner plastic grid rods, so the other end of the structure does not move," explained Kathryn Matlack, a postdoc in Daraio's group.

Materials for absorbing vibrations already exist. In vehicles, machines and household appliances, vibrations are partly absorbed using special, mostly soft materials. The ETH researchers' vibration-absorbing structure is different because it is rigid and can thus also be used as a load-bearing component.

BRITISH ENGINEERING SERVICES ACQUIRES NORTEST

British Engineering Services has acquired Nortest, a non-destructive testing business based in Salford. Nortest offers a range of non-destructive testing, positive material examinations and welding certification services. Nortest will continue to trade from its custom-built laboratory in Salford.

GXE breaks electric vehicle land speed record

Genovation Cars, a manufacturer of advanced green vehicles, has broken the land speed record for a street legal all-electric vehicle with its Genovation Extreme Electric car (GXE). The GXE reached 205.6mph during supervised tests at Space Florida's Shuttle Landing Facility at the Kennedy Space Centre.

The previous record, which also was held by Genovation, stood at 186.8mph. The GXE is a Z06 Corvette that has been re-engineered by Genovation, and includes a state-of-the-art battery management system, inverters, batteries and motors that produces 660hp. The car is said to have a range of 130 miles during normal driving operation with a near 50/50 weight distribution and a low centre of gravity.

NEWS

Driving customisation

Covestro has revealed the prototype of a new design for a steering wheel cover. This development features a wide range of colours, surface structures and tactile properties that can be reproduced on the same component from a single mould using DirectCoating.

The coated component is produced in a two-component mould using a two-stage process in an injection moulding machine. Having undergone injection moulding in the first cavity, the plastic substrate is then transferred to a second cavity that is one coating layer thickness larger. The solvent-free coating system is injected into this mould via a RIM (reaction injection moulding) mixing head. This creates a polyurethane-coated component that requires virtually no post-processing.

DirectCoating/DirectSkinning technology aims to meet the requirements of car buyers and manufacturers alike. While consumers prefer a personalised vehicle interior with a premium appearance and an attractive design, the automotive industry is looking to manufacture components efficiently. Interest in this new technology is thus growing steadily, and it is now used in series production.

IET Bursaries challenge backgrounds

The Institution of Engineering and Technology (IET) is encouraging students and apprentices who have overcome obstacles or personal challenges to take advantage of a new package of support which will help them pursue their passion for engineering. The Engineering Horizons Bursary will be awarded to six promising engineers of the future who are taking a vocational route into engineering or need financial assistance to complete their studies.

"We have created these awards to ensure that personal circumstances aren't a barrier for new talent entering the profession whether that is at student or apprentice level," said Linda Deleay, IET awards & prizes manager. "These awards send a clear message to young people: a career as an engineer or technician is a choice for anyone regardless of their background, gender, financial or personal circumstances."

Faye Bank, head of North East operations at the National Grid said: "The advice and support I received from winning an IET prize has played an important role in enabling my journey from school leaver with no qualifications, to apprentice and ultimately the job I do today at National Grid. So if any teacher, careers advisor or family member knows someone who would benefit please actively encourage him or her to apply. Your support could change a life."

Customisable positioning systems for an ever-changing market

By Steven Lockett, Sales Manager, PI (Physik Instrumente) Ltd

Precision motion and positioning is crucial to high-tech research and product development, with applications from microbiology to space exploration requiring advanced positioning solutions. This can pose a real challenge for positioning system manufacturers, requiring a large, flexible product range to meet the requirements of diverse market sectors. Inevitably there are situations where no standard product will perfectly match an individual project's needs, instead requiring a bespoke solution. Developing such customised solutions in house can be expensive, time consuming and complex, and many companies turn to experienced OEM providers – such as PI Ltd – for the design and development of custom motion platforms.

Establishing credibility

Regardless of the intended application, any OEM provider's customised solutions will be grounded in their existing technologies and expertise. This makes a company's standard product range a 'shop window' of its capabilities, demonstrating the performance of its technologies and establishing its credibility as a manufacturer. More than that, a broad product portfolio provides a basis for the development of tailor-made solutions, offering a range of tried and tested options that can form the foundation of a custom positioning system or provide inspiration for the development of a novel solution.

Design freedom

Product designers and engineers want complete flexibility in system design, giving them the freedom to develop any solution they consider suitable for the intended application, rather than being constrained by the physical limitations of the positioning technology. Choosing an OEM provider which can offer a broad range of technical solutions – using a choice of drive technologies – can help to ensure that product

development is not restricted in this way.

Similarly, choosing a provider which has full in house manufacturing capabilities can have significant benefits. For example, the ability to design and manufacture prototype or custom components has the potential to significantly shorten development timelines. Together with greater freedom in component design, this helps to ensure faster development of an optimised positioning system.

Another consideration, which is becoming increasingly important, is the effect of OEM component integration on the aesthetics of the final product. There is now an expectation amongst the 'iDevice' generation that research or industrial equipment will follow the same visual trends as consumer goods, and sales of traditional 'grey box' solutions are increasingly losing out to sleek looking instruments.. Development of more compact, streamlined and ergonomic systems can pose a real challenge to product designers, and custom solutions are crucial to achieving the desired aesthetic appeal. By developing novel components and positioning systems which can fit into the space available, OEM providers can help to achieve the desired product look without compromising on performance, making the ability to design, test and reliably manufacture these specialised or unique components vital.

Knowledge and expertise

The success of customised positioning solutions – from the initial concept discussions, through design and prototyping, to the finished product – is entirely dependent on the skill and expertise of your chosen OEM partner. Application knowledge and experience within the relevant market are critical to ensure that the proposed solution meets not only the technical brief, but also addresses control and communication criteria and validation requirements.

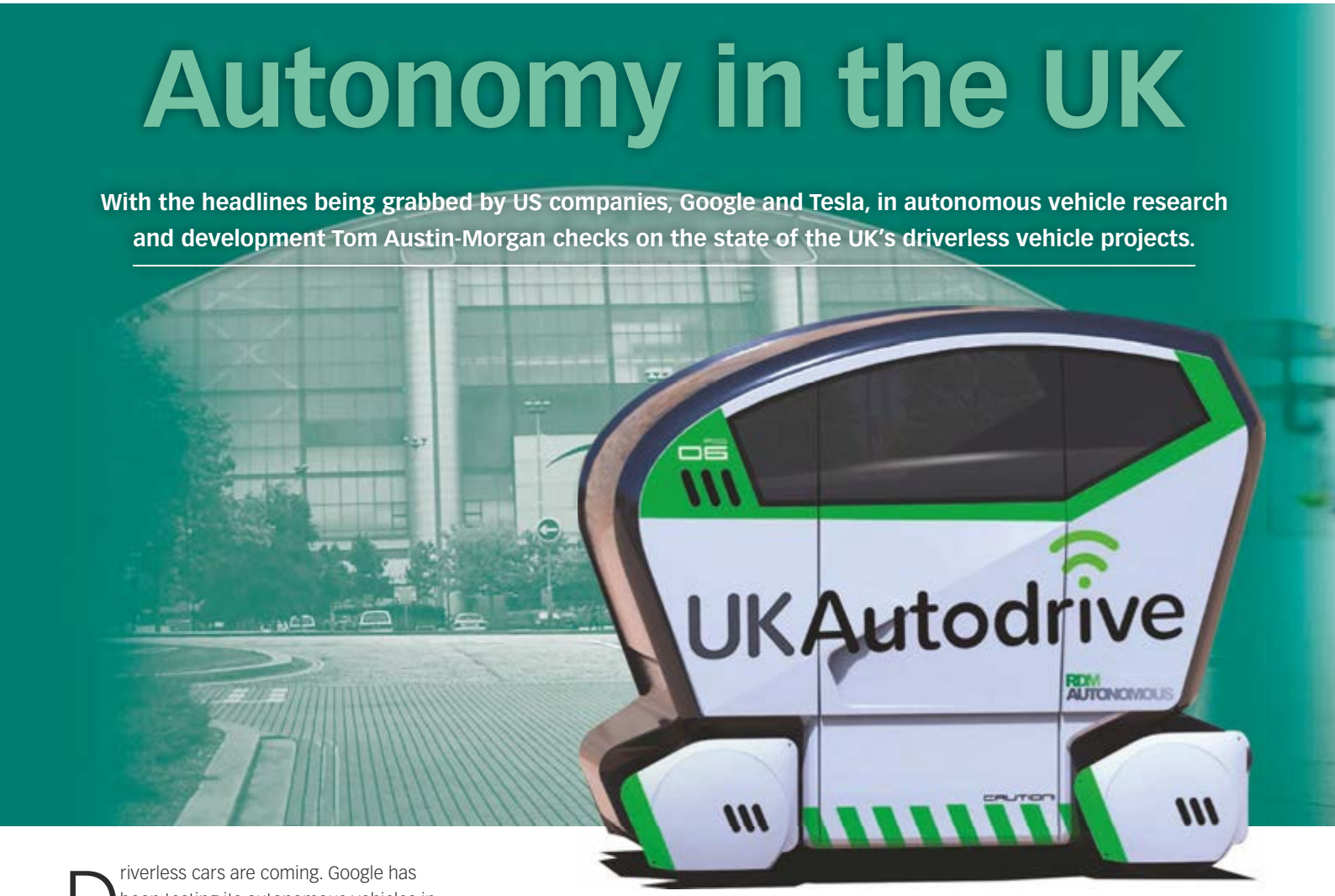
National and international regulatory standards are another key consideration which can significantly impact on development timelines. Again, choosing a global OEM provider with a broad standard product range may provide significant advantages here, as this should ensure the relevant quality control and validation procedures are in place to address your local needs. To further accelerate time-to-market, specialist OEM providers can also undertake much of the testing of your custom solution, or even complete positioning modules, on your behalf, allowing you to benefit from their in-house QC systems and established relationships with relevant regulatory bodies.

In summary, choosing an OEM provider with a large standard product portfolio, in-house manufacturing capabilities and extensive product expertise can help to ensure the long-term success of a product and accelerate time-to-market.

The PI team can be contacted at:
uk@pi.ws
01234 756360
www.physikinstrumente.co.uk

Autonomy in the UK

With the headlines being grabbed by US companies, Google and Tesla, in autonomous vehicle research and development Tom Austin-Morgan checks on the state of the UK's driverless vehicle projects.



Driverless cars are coming. Google has been testing its autonomous vehicles in California, Texas, Washington and Arizona for the last few years and has clocked up 1.5million miles in total. Tesla was the first company to upgrade its current fleet of Model S cars with an AutoPilot feature with version 7.1 of its software updates in January 2016. But where are the high profile schemes being trialled in the UK?

In the fallout from the vote to leave the EU, the UK may now be in a better position post Brexit, as it never ratified the Vienna Convention, which requires, 'every driver shall at all times be able to control his vehicle'.

It means that connected and autonomous vehicles (CAVs) in the UK are not just confined to test tracks or certain geographical areas, do not need to obtain certificates or permits, and are not required to provide a surety bond – provided insurance has been arranged.

Already seen as an attractive test-bed for automotive technologies, Britain is likely to become more attractive than other European countries now it is freed from EU red tape, making it likely to be less complicated to test CAVs in this country.

In a report entitled, 'The Pathway to Driverless Cars', published in February 2015, Claire Perry, then Parliamentary Under Secretary of State for Transport, said: "This creates a tremendous opportunity for the whole country to share in shaping the future of these exciting developments and the Government wants to play its part in making that happen. I believe we have one of the most welcoming regulatory environments for development of this technology anywhere in the world."

The Government has put plans in place, included in the Queen's Speech earlier this year, to make Britain a world leader in self-driving vehicle technology. These included setting up the Centre for Connected and Autonomous Vehicles as well as a £20million investment from the Department of Business, Innovation and Skills into collaborative research and development projects and feasibility studies into CAV and transport systems.

Automotive manufacturers Ford, Nissan, Volvo and Jaguar Land Rover are all planning to test autonomous versions of their vehicles on the UK's motorways and on London's roads. Pods are already in use at Heathrow, although these currently run on designated tracks rather than completely autonomously. However, there are already four projects in development in Bristol, Coventry, Greenwich and Milton Keynes that are at the stage of testing the vehicles on the roads of those cities.

Coventry and Milton Keynes

UKAutodrive is a three-year project that started in November 2015, overseeing projects in Milton Keynes and Coventry where the consortium is working on CAV technologies around both cities. In Milton Keynes, it is also working on delivering a fleet of 40 fully-autonomous pods, able to travel at up to 15mph, which will act as a public transport system.

"We are in the planning stages of designing the vehicles and the safety aspects, what parts of the cities we will use for the trials and where the routes for the autonomous pods will run," said Danielle McGrellis, UKAutodrive project manager.

"Our first demonstrations with the connected cars will be taking place in the Autumn of 2016 on Horiba-Mira's test track, moving to closed city roads and then onto open roads by the end of the project. The autonomous pods are due to arrive in Autumn of 2017, starting off with three or four being demonstrated, increasing to the full 40 in Spring or Summer of 2018."

UKAutodrive is working with Ford, Jaguar Land Rover and Tata Motors on connected vehicles with each working on sensor systems for their individual cars that will likely use a combination of cameras, radar and lidar as well as the relevant software platforms and algorithms to complete the full system.

Autonomous vehicle developer, RDM, is providing the sensor systems, which will map its immediate surroundings and combine this with information about the city's layout by communicating with a central database.

In September 2016 UKAutodrive will launch a public survey to understand public attitudes towards self-driving technology as well as examining the business case for self-driving pod vehicles, how the technology can be scaled up and how the eventual roll out of these vehicles could affect congestion levels. A further survey will be undertaken at the end of the project in 2018 to judge how perceptions have changed.

Public perception in Bristol

Venturer is a three-year project, co-funded by Innovate UK, being held in and around Bristol and South Gloucestershire. This project is focussing on public perception as well as the technology side of the trials and aims to understand the barriers to the wide scale adoption of CAVs.

Further Information

If you want to find out more about autonomous vehicles in the UK, **Danielle McGrellis,** who is Project Manager for **UKAutodrive,** will be speaking at the **Engineering Design Show**. Visit **www.engineering-design-show.co.uk** to register or for more information.

Initial tests have taken place in August at the University of West England's campus with further testing of autonomous vehicles scheduled to take place on roads in South Gloucestershire and Bristol city centre in 2017 and 2018. During these tests the project aims to engage and share information with the public and industry.

Over the last year, the academics and business leaders working on the Venturer project have been working on logistics, technology, legal and insurance issues.

The autonomous pods themselves are due to be trialled on the streets of Bristol in the Summer of 2017.

Gateway to Greenwich

Professor Nick Reed, academy director at TRL and GATEway technical lead, said: "The project is progressing nicely and over the past nine months we have been working hard to lay the necessary foundations to ensure trials are optimally developed and delivered, and all risks understood and mitigated."

The project has also started its pre-trial engagement activities, working with members of the public to ascertain people's thoughts and feelings towards automated vehicles. The Royal College of Art is hosting in-depth research workshops and an online sentiment mapping tool has been developed by Commonplace. According to Prof Reed, over 400 people have participated so far and the overall response has been positive.

"There are many challenges to using low speed automated vehicles in a pedestrianised area like the one we are using in Greenwich," explained Prof Reed. "We have had to create new digital maps of the area; GPS accuracy is inconsistent; vehicles are operating on a mixture of roads and pavements and must respond appropriately to pedestrians, cyclists and animals; and the vehicle fleet must be co-ordinated to meet consumer demands."

To overcome these challenges, the GATEway vehicles will use the Selenium autonomy control system from Oxbotica. This guides the vehicle safely, creating and following its own digital maps in these types of challenging environment and without reliance on GPS or infrastructure beacons.

The CAV projects are also encouraging UK innovation: "We have utilised a 100% British supply chain for the development and supply of the vehicles," said Prof Reed. "We feel that this is a very positive outcome for the UK's position in the development of vehicle automation in a highly competitive environment."

These four projects are about to shift into a higher gear. Over the next few months CAVs and driverless autonomous pods will take to the streets en masse across the country with the consortia behind them attempting to win the hearts and minds of the public.

However, their job may have become easier than it was, even since the conception of these projects, as public opinion seems to have evolved over the last two years. A survey by Churchill Car Insurance taken in 2014 found that 56% would never buy a driverless car, with only 8% saying they have no safety concerns about self-driving technology. In June 2016, Opinion Matters ran a survey that found 78.1% thought autonomous driving would have a positive impact on commuting.

The UK projects are all reporting positive advances, which seem to mirror the recent apparent change in public opinion. Much more will be made in the press in the next two years around the progression of the UK's CAV projects and their impact on the UK's automotive sector. Driverless cars are coming – in fact they may be just round the corner!

Government timeline for the development of CAVs

As part of the **2013** National Infrastructure Plan, the Government pledged a review of the legislative and regulatory framework to enable the trialling of driverless cars on UK roads. These plans were also announced in the 2013 Autumn Statement.

On **30 July 2014**, the Government launched a 'driverless cars' competition inviting UK cities to join together with businesses and research organisations to host vehicle trials locally. The results were announced in **December 2014** with Greenwich, Milton Keynes, Coventry and Bristol being selected, and £19million being provided by the Government to allow testing of automated vehicle technology.

Spring 2015: Publication of a Code of Practice, to promote safety and set clear guidance to be followed for responsible testing. Those conducting CAV tests were required to provide information about their testing to the public, as part of their risk management process, taking into account the views of relevant stakeholders such as local highway authorities.

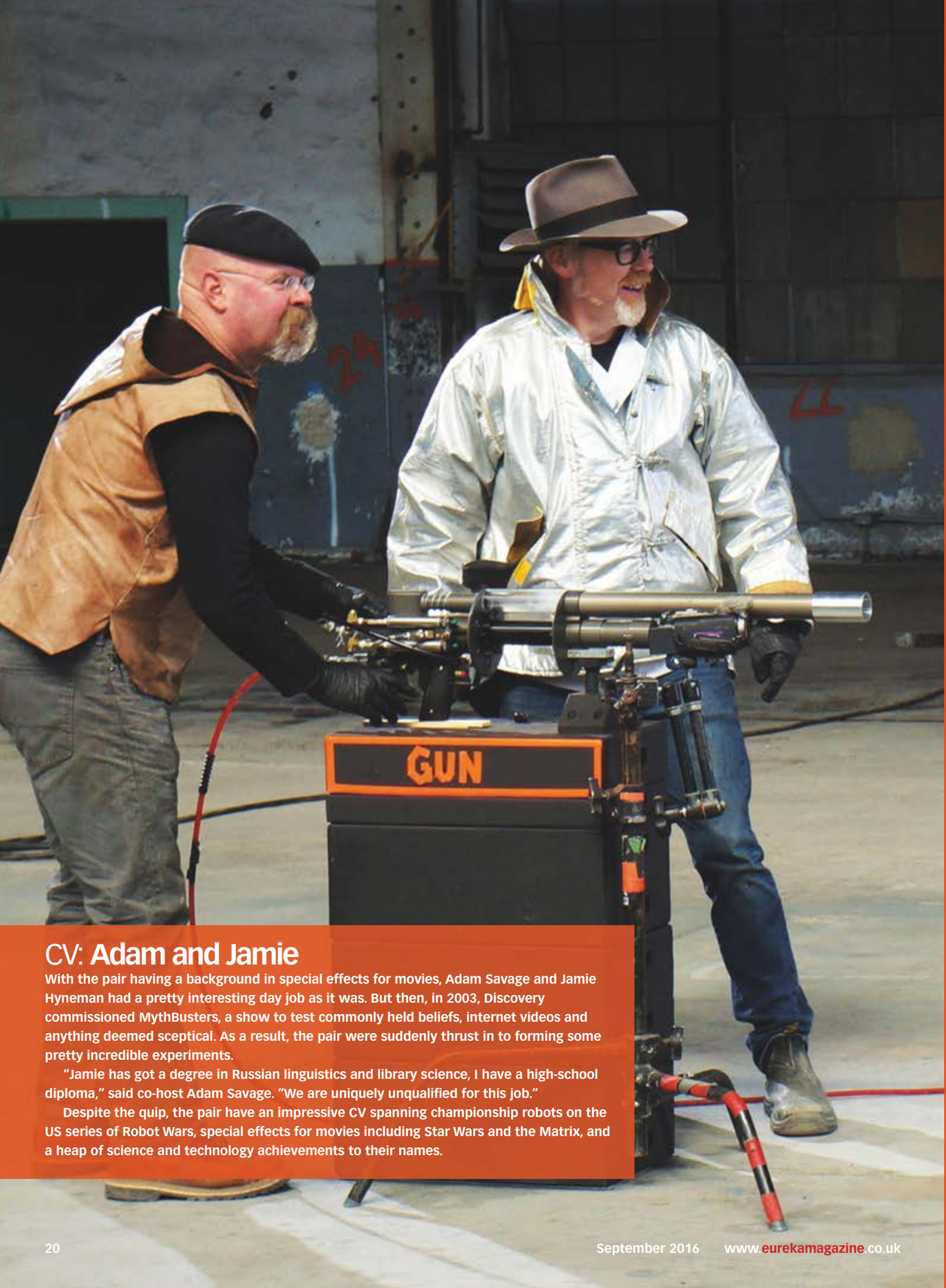
Summer 2017: Government to review and amend domestic regulations to accommodate driverless vehicle technology.

Summer 2017: Analyse existing regulations on vehicle use to ensure that automated vehicles are used and maintained in such a way as to preserve their compliance with road traffic law.

Summer 2017: Review existing vehicle use requirements in the light of evidence and experience gained from automated vehicle testing.

"We have utilised a 100% British supply chain for the development and supply of the vehicles."

Professor Nick Reed



CV: **Adam and Jamie**

With the pair having a background in special effects for movies, Adam Savage and Jamie Hyneman had a pretty interesting day job as it was. But then, in 2003, Discovery commissioned MythBusters, a show to test commonly held beliefs, internet videos and anything deemed sceptical. As a result, the pair were suddenly thrust in to forming some pretty incredible experiments.

"Jamie has got a degree in Russian linguistics and library science, I have a high-school diploma," said co-host Adam Savage. "We are uniquely unqualified for this job."

Despite the quip, the pair have an impressive CV spanning championship robots on the US series of Robot Wars, special effects for movies including Star Wars and the Matrix, and a heap of science and technology achievements to their names.

The Mythbusters

After 14 years of challenging commonly held beliefs and movie scenes, the MythBusters television show has come to an end. The series used scientific methods to test the validity of rumours, myths, adages, internet videos, and news stories. Justin Cunningham reports.

If you missed it, MythBusters produced some amazing stunt-like experiments that put to the test commonly held ideas and beliefs such as, can a sinking ship really suck you under, can you survive jumping out of an aeroplane in a life raft like Indiana Jones, and can a mobile phone really set off an explosion in a petrol garage?

Over its 14 year run, it was apparent that the pair have had a lot of fun investigating and unravelling a great many myths, and also confirming others. It was compulsive viewing. And if the opportunity arose for an explosion, the team were certainly fans of making things go bang.

"It was 270 hours of television, somewhere just shy of a 1,000 separate myths, 4,500 explosions, 7.5 tonnes of explosives, 80 miles of duct tape and over a hundred cars were destroyed," said co-host and technologist, Adam Savage. "Figuring out that process of how to tell a story and the methodologies of the experiments was often an incredibly messy, wonderful process."

One thing that was apparent over the course of the programmes was that Savage and co-host Jamie Hyneman are no slouches when it comes to technology, and their own abilities to set up, carry out and investigate what it was they were testing developed massively as the series progressed. Not only from an investigative point of view, but also in terms of how they communicated with the audience.

"As the show developed, so did we, in terms of our scientific understanding and our methodological sophistication."

"If you watch MythBusters in the early years, you will see that all the experiments are very crude and sort of surface level," said Savage. "As the show developed so did we in terms of our scientific understanding and our methodological sophistication.

"We also got better at telling the stories. My goal was always, 'can the audience look at our experiment from any camera and understand what is going to happen?'. We were always trying to communicate [the science and engineering] in an intuitive way so people can really get it."

As the series progressed and the team vied for more sophisticated experiments to gain a deeper insight to a myth, it called for better sensors, to gain better data, which wasn't always easy.

Hyneman continued: "In the early days we would find that the sensors were not working great in the 105°F Californian sun. We would have to either hack the sensors or build our own, and towards the end we developed a great friendship with National Instruments to custom build these sensor arrays. There was a lot of engineering that went into making sure that our data would be retrievable at the end of the experiment. Especially, if we were blowing stuff up."

Like most engineers, both Savage and Hyneman always approached a problem thinking they knew best. And like most, each would take a strong stance about how to move forward, which although caused friction between the pair, also formed a mutual professional respect.

"We both considered it a point of pride to be able to do an about-face without hesitation the minute that it's apparent that one idea is ahead of the other," said Savage. "The priority must be doing the best job you can, and not satisfying your own ego by doing it your own way."

The two know that their conclusions are not always the set in stone comprehensive results that you might expect from an engineering firm, but they do stand behind the reasoning and methodologies of the experiments.

"We felt that those are really quite sound," claimed Hyneman. "That is the legacy that we are really proud of in terms of both how we learned and we have been able to tell those stories.

"That may not work in industry to have that kind of attitude, but for us, if we screwed something up it meant we learnt something."

Adam Savage and co-host Jamie Hyneman were speaking at this year's PTC LiveWorx event in Boston under the umbrella theme of the Internet of Things. So what do they make of the fledgling IoT industry? "I have a love/hate relationship with it," said Savage. "I've got a lot of different IoT in my house, but I don't think I am in the market for a water bottle that tells me when I am thirsty. But, generally, I love the technology."

While Savage is clearly enthusiastic about IoT, his demeanour is contrasted by the dryer Hyneman, who said: "I'm not afraid of technology, I embrace it and use it. But I don't take the first thing that comes out because a lot of times it doesn't work. And frankly, I'm irritated with the stuff that is already out there that doesn't work."

He asked the audience of 2,500 strong engineers, how many have had trouble installing a printer? Or printing a 100-page document on both sides? At least three quarters raised their hand with muted laughter spontaneously breaking out.

"I am of at least average intelligence," he said, "and I can't tell you how many times I can't figure it out. It shouldn't be that hard. How long have we had printers around, and now we are talking about putting the fridge online?! It's like, fix the darn printer first!"

Shorten your development time with speed and accuracy.

3D CAD online ordering can mean same-day manufacturing!

Our **CNC turning** and **milling** use a range of engineering-grade plastics and metals, including soft metals and steel. Our quick turnaround times mean that you won't lose valuable development time. Get 1 to 200+ parts in 3 days or less.

3D PRINTING | CNC MACHINING | INJECTION MOULDING

proto labs®

Real Parts. Really Fast.™

Order online anytime | Free design analysis

Rhys Wilkinson
Account Manager

protolabs.co.uk
+44 (0) 1952 683047
customerservice@protolabs.co.uk

OPTIMISED starting position

Design optimisation has been adopted by the automotive industry in its quest to lightweight. But now, as Tim Fryer reports, the technology is finding wider appeal.

The crown for the BCIT mountain bike is a high stress part so design optimisation was used to design a component that was light and would survive the forces put on it

Where does a design start? Is it a scribbled concept on a piece of paper, the more considered drawings in CAD, or perhaps an existing component that will evolve into your new design?

There is a growing body of design engineers, particularly those in the automotive sector, who believe that the design process should start with the defining of the function and the space it has to operate in. If this is done accurately in conjunction with design or topology optimisation techniques, the engineer's starting point becomes a model that is already equipped to cope with the forces that it will be subjected to.

Such design optimisation tools have been around for several decades but a number of factors have driven its rise in popularity. As with all software tools it has simply got better over the years, and more recently it has been easier to integrate into an engineer's CAD environment. 3D printing also lends itself to this technology and finally, environmental legislation has had a considerable effect on automotive emissions and the consequent need for cars to be lighter.

Put simply, if an engineer can define the maximum allowable shape that a part can fill, and then define the loads that are going to act on it, the structural optimisation software can erode away what is not needed. It may well end up with Gaudi-esque curves and arches that are not typical of the parallels and perpendiculars in traditional design, but it will leave the lightest framework for the part that will fulfil the required function. It will not be a finished design, but it gives the engineer a base to start on.

Martin Gambling, managing director of GRM Consulting commented: "Rather than designing a thin, slender frame by iterating time and again to get it as light as you can without exceeding all the requirements for stiffness or stress limits, you just go into the program, set the weight, run the optimisation and then you have a part you can bring in."

Although ideal for single components, it is not confined to that, as Gambling explained: "You can take a bigger picture and can apply it to the entire chassis of a car as well. It tells you exactly where the most efficient paths are for all

Aluminium problems

Altair has collaborated with Ferrari to design and engineer the company's 'Next Generation' vehicle platform, which will be the basis of several new flagship vehicle derivatives. To develop this platform, Altair supplied a specialised group of designers and engineers working on-site at Ferrari's vehicle development centre in Italy. The team worked alongside Ferrari's own design, engineering and manufacturing teams.

Maximilian Szwaj, Ferrari's director of innovation and BIW development, stated: "It was important for Altair to supply both CAD and CAE expertise to facilitate tight integration particularly when packaging ideas and manufacturing processes are so fluid. The speed of the optimisation processes deployed were able to control the weight whilst achieving the demanding structural targets as new packaging changes were introduced."

Ferrari and Altair's team successfully utilised innovative design optimisation methods (e.g. Altair's Concept Optimization Driven Process C123), driven by the HyperWorks suite of simulation technologies. The Next Generation platform is 15% lighter, while enhancing the performance of crash, NVH and other critical attributes by over 20%. Altair's solver and optimisation technologies, RADIOSS and OptiStruct for crash and NVH respectively were key tools in achieving the weight and performance characteristics.

Dr Royston Jones, Global CTO, Altair ProductDesign, commented: "I love the Next Generation architecture, it has an organic nature, with the structure flowing smoothly from sections to joints. It's an outcome of a massive deployment of structural optimisation defining optimum material layout resulting in outstanding weight / performance characteristics. I believe it truly warrants the title of Next Generation and importantly, repays Ferrari's trust."

the loads. The fact is, a car's chassis has to fulfil many, many different requirements – crash performance, stiffness, vibration and so on. A good designer can identify the right load path for one load case, but if you've got 50 or 100 load cases and you need a compromise of all of them... that is where optimisation can really allow you to stretch your legs."

GRM's solution is based on design optimisation software from American company Vanderplaats Research & Development and, beyond reselling and supporting the package, GRM's software development team is delivering bespoke solutions in the UK.

Traditional adopters of the technology have been automotive and motorsport, and that is where the bulk of applications remain, but medical, rail and aerospace sectors are also now regular users and, according to Gambling, it is a useful starting point for any design process.

Fans of Hitchhikers Guide to the Galaxy will remember the answer to the question about life, the universe and everything, was 42. The problem being the lack of definition in the original question. The same is true here – defining the initial parameters for a design may not be instinctive if that is not an engineer's mindset, but asking the right questions will get the best answer. What will undoubtedly help is that GRM is making the technology available to mainstream CAD users.

"A good engineer with optimisation will develop a better product than a good engineer without."

Martin Gambling

Using optimisation techniques

- **Reduces time/cost by 20% when 3D CAD used**
- **Reduces time/cost by 75% when 3D CAD not used**

In particular, GRM has developed TruForm SW, which is an integrated simulation solution for Solidworks, available as an add-on through Solid Solutions. Engineers in the comfort zone of the Solidworks ecosystem will be able to seamlessly use the programme, pulling on materials' databases and resulting in a model in Solidworks ready for the engineer to cut loose on. The tools also feature in Abaqus and ANSYS simulation offerings.

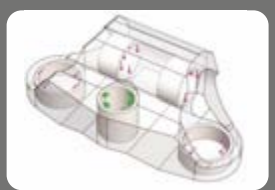
Creo users can look forward to having their own version this autumn and SolidEdge early next year. It allows a useful and effective introduction to the technology, while the more powerful version (called Genesis) waits in the wings for those who want to take it to the next step.

Additive manufacturing has also turned into an ally as the geometry of a part makes little difference to the printing process. The shapes produced by the topology optimisation process might be the best technical solution, but they could also be either awkward or impossible to make if they are to be cast or machined, without further work on the model. A 3D printing process has no such restrictions, as long as the designer is happy that the necessary transition from prototype to volume production will not throw up problems.

There may be engineers thinking that this technology goes a step too far in automating their role. Gambling has reassuring words: "It's not. It's an extra tool in the toolkit of good engineers. A good engineer with optimisation will develop a better product than a good engineer without. But equally, if you give optimisation to a bad engineer, he can still create rubbish quite happily. It's not going to solve the fact that a good brain will get you there."

BCIT Downhill Bike Crown

Package Space Creation in SolidWorks



Loads Definition

Topology Optimisation using TruForm SW

CNC Aluminium Design

3D Printed Titanium Design

lpe
laser prototypes europe ltd

CELEBRATING 25 YEARS 1991 - 2016 LASER PROTOTYPES EUROPE LTD

Additive Manufacturing Services

LPE offer a range of services including

STEREOLITHOGRAPHY (SLA), SELECTIVE LASER SINTERING (SLS),
5 AXIS CNC, METAL SINTERING and VACUUM CASTING

Join LPE at TCT + Personalize

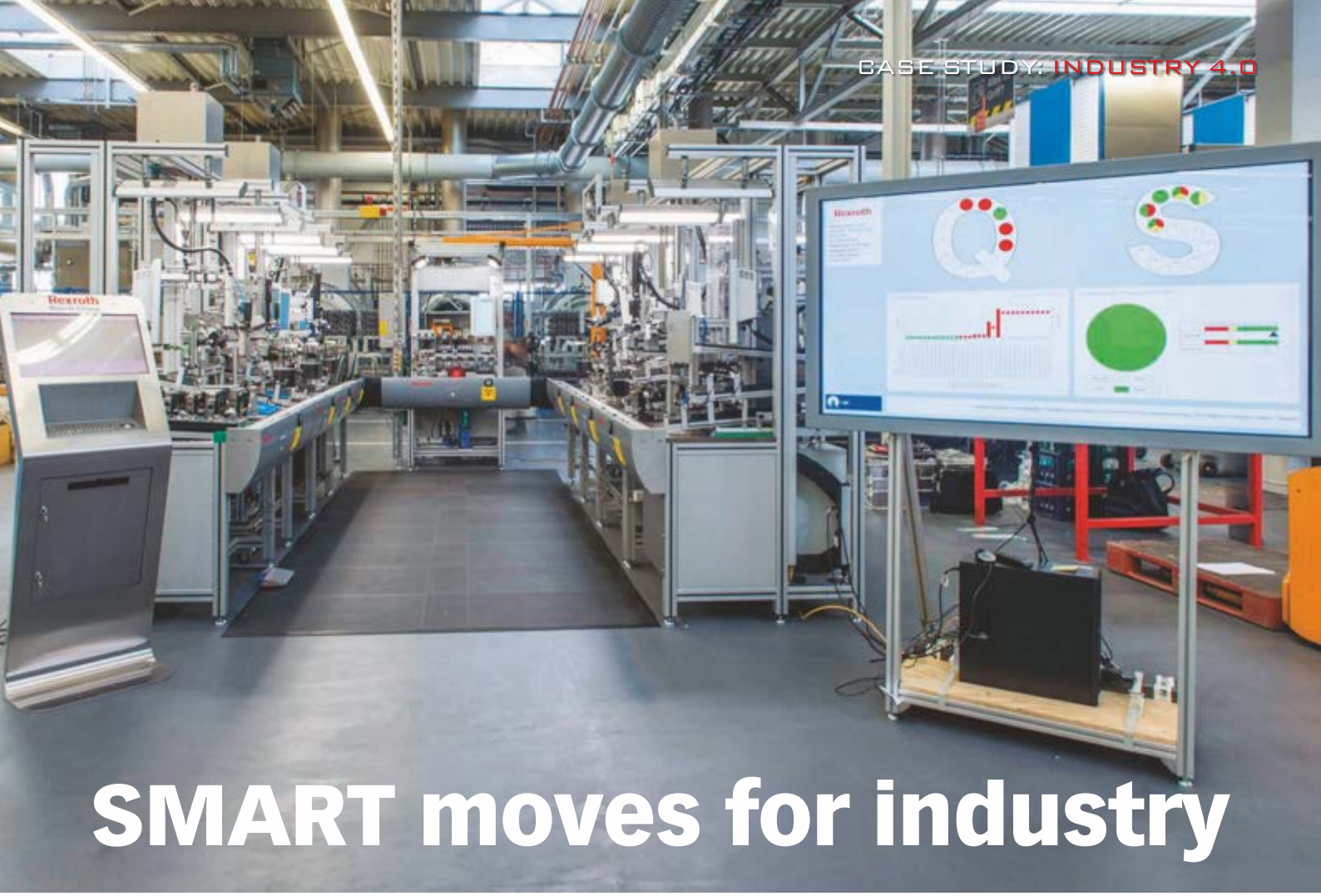
NEC, Birmingham 28th - 29th September 2016

Stand C38, Hall 3A

nqa ISO 9001 Registered Quality Management

Call: 028 9070 6940 Web: www.laserproto.com
Email: sales@laserproto.com

nqa ISO 13485 Registered Medical Devices



SMART moves for industry

What makes Industry 4.0 meaningful is to see it in action. Tim Fryer went to visit a factory in Germany that was using it selectively and successfully.

One of the issues with Industry 4.0 is that people tend to define it in a manner that suits their business needs. The Internet of Things, Cyber Physical Systems, Industry 4.0 et al are essentially variations on the same theme, and it probably will be the case when enough time has passed that this era will be looked back on as the fourth industrial revolution.

The detail is less clear. Connectivity whether it is from man to machine, and/or machine to machine, and/or one system to another system, will be found in any project purporting to go under the Industry 4.0 banner. But does that mean that anything that is connected counts as Industry 4.0? Or to take it a stage further, anything with remote control? Maybe any manufacturing system that can respond to change in real time?

Many people's definition might be covered by Manufacturing Execution Systems (MES) or Enterprise Resource Planning (ERP) software, and they have been around for a couple of decades, which makes the revolution a slow one. But most would concur that if the Industry 4.0 path was travelled, the destination would be some form of 'smart factory' – a place where orders went in and products went out – possibly with little human interference along the way and with efficiency, cost effectiveness and environmental performance all maximised.

"We don't want to guide the process and control the people. We want to guide the people to control the process."

Matthias Muller

Bosch Rexroth launched its own Industry 4.0 project back in 2013, more for its own manufacturing purposes than as a profit stream in its own right. Although this will be an evolving process, it now has its own smart factory – or part of a factory at least – supported by some interesting capabilities that others could use to implement a similar solution.

Making valves blocks

The factory in question is the Bosch Rexroth factory at Homburg, Germany where hydraulic valves are manufactured for the mobile machinery market. Turning the factory in its entirety into a smart factory, however, would not have been that smart. There are a number of production lines dedicated to the long runners – standard products that can be manufactured en masse for stock, with few, if any, changeovers required on the production lines. Re-building these lines would have little benefit.

Alternatively, there was one line on which 30 to 50 variants of each of the six product families were produced, so in total there were over 200 products that came off it. This was to become the focus of the factory's Industry 4.0 development and ultimately became its i4.0 line. Bosch has the luxury of having 250 plants worldwide in which to test new technologies and currently more than 50 pilot projects for 'connected industry' have been initiated. The Homburg i4.0 project kicked off in 2013 and was one of the company's earliest

investigations into this field. As a user of the technology the company believes it can save around €1bn in process improvements, while it can add to its turnover by a similar amount by selling the technology.

Describing the driving force behind the Homburg project, one of the Industry 4.0 pioneers at the site and deputy plant manager, Matthias Muller, observed: "We all want our own customised product, but at the cost of a serially produced part."

This is as true for customised consumer products as it is for bespoke industrial parts – valve blocks for tractors in the case of the Homburg facility. The resulting i4.0 line consists of nine autonomous, intelligent workstations. Products contain an RFID chip so that the progress of the product can be identified at each workstation and appropriate instructions displayed to the operator.

"We don't want to guide the process and control the people," continued Muller. "We want to guide the people to control the process."

This highlights one of Bosch Rexroth's principles in developing Industry 4.0 strategies – people remain the key. And people are very much a key part of the i4.0 line. This line is not about pure automation as might be expected in a smart factory, it is about providing the most appropriate solution. In this case that involves manual assembly using all the information available to make the process efficient and failsafe.

In the same way as the RFID tag identifies the product arriving at a workstation, the operator is identified by a Bluetooth connection, which will reveal a profile of that operator and skill levels, so instructions can be modified accordingly.

Other features of the workstations, which come under a system called ActiveAssist, include

interactive worker instructions, hand tracking, 'pick to light' worker guidance, ultrasound positioning – essentially a combination of finely tuned sensing and guidance technologies. It guides assemblies and then checks that the required action has taken place. The capabilities of the system, believes Bosch Rexroth, will appeal to many companies with a similarly low volume/high product mix output and as a consequence ActiveAssist will soon be finding its way onto the market as a product in its own right.

Perhaps going further down the Industry 4.0 route, and certainly further down the road to commercialisation, is ActiveCockpit. This was originally developed for this line, by the Homburg team, but following its success it has been rolled out to industry.

Part of the company's definition of Industry 4.0 is, 'the unification of the real world of machines with the virtual world of the internet and information technology', and while ActiveCockpit certainly fits the bill, the accent is on information rather than control. It is an interactive communication platform that offers real time access to process data. Real time is the key here. While many factories and organisations will pride themselves on up-to-date colour-coded spreadsheets that provide all sorts of information about quality safety and, of course, the products that are being made, they are only as up-to-date as the last time these sheets were printed off.

ActiveCockpit provides a digital connection between operator, product, workstation and process. It collects and filters data which is then visualised on a whiteboard close to the production process. For all that it was developed for this site, there are software connectors to make sure that any MES or ERP feeds into it.

In practice this means that the end customer will specify a tractor with the OEM and this information is automatically fed into the Bosch Rexroth production line at Homburg, which will then churn out the desired valve block within 24 hours. Muller said: "It is a step up from 'delivery in sequence', which is just picking from stock. This is a new level 'production in sequence'."

Even though it remains a manually intensive process, it is the i4.0 developments at Homburg that have made this possible. It allows data to be amalgamated and visualised directly at the i4.0 line by all those who need to respond instantly to that data. Ultimately it provides better visualisation and decision making.

Ben Morgan, head of the Integrated Manufacturing Group at the AMRC was also in Homburg assessing the impact. He summed up: "It's easy to measure output. It's less easy but possible to measure quality. But the real benefit, and most difficult to quantify, is flexibility."

Designing equipment and systems for Industry 4.0 still remains a moveable feast as stated before. It means different things to different companies. But the increasing evolution of modular solutions, like ActiveAssist and ActiveCockpit, could both make the process easier and perhaps help define the direction.

Fact file

i4.0 implementation at Homburg has:

- **Reduced set-up time from 450sec (in 2014) to 0**
- **Inventory days reduced from 3 days to 1.5**
- **Cycle times reduced from 474sec to 438**
- **Overall production improvement – up 20%**

Come to a place where exceptional engineers take on the most interesting challenges and work with fantastic colleagues. We make a difference. Do you want to?

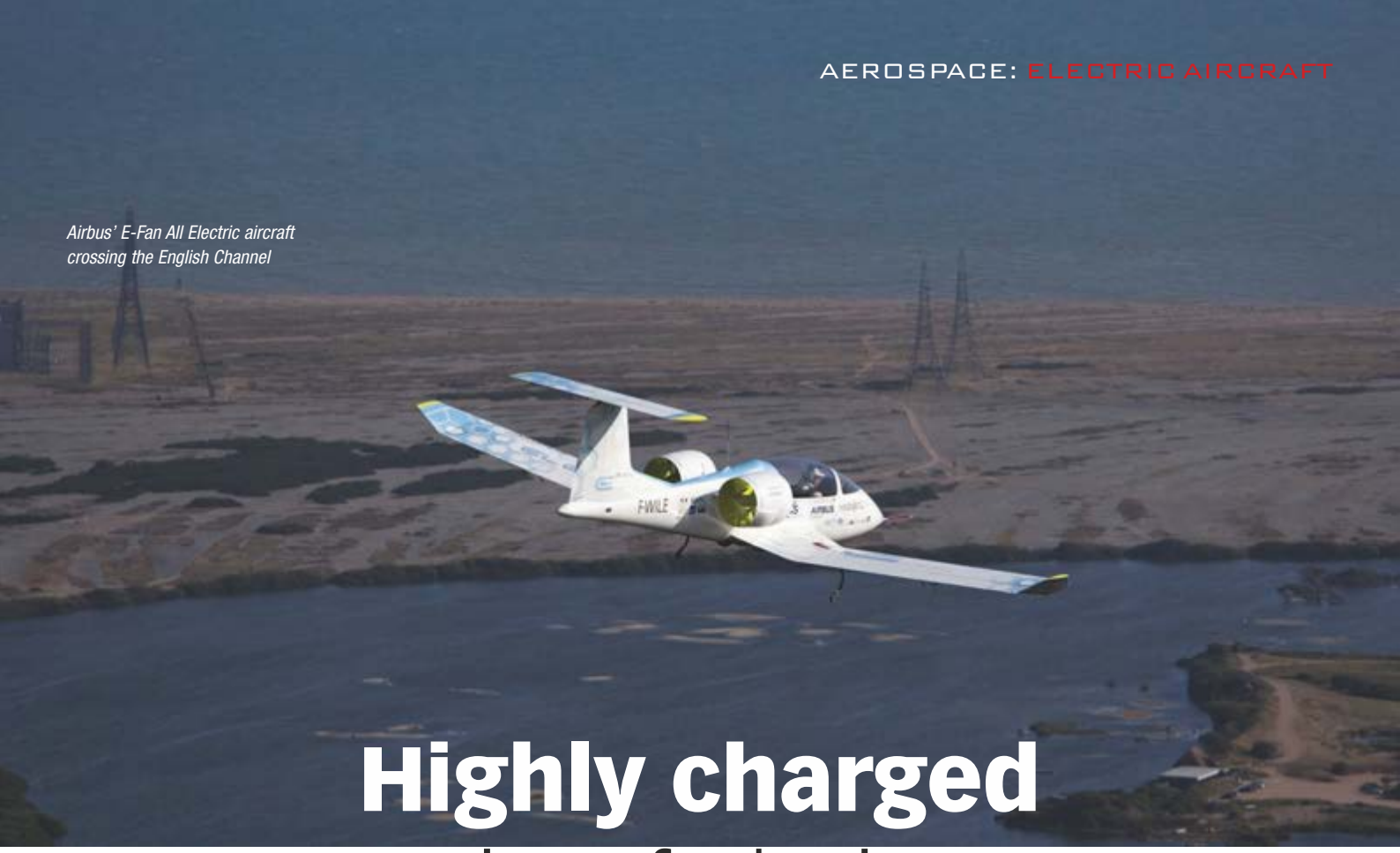
Product Developers &
Technology Consultants

reddot award 2016
winner

THE SUNDAY TIMES
100
BEST COMPANIES
TO WORK FOR
2016

www.CambridgeConsultants.com

Part of the Altran group, a global leader in innovation. www.Altran.com



Airbus' E-Fan All Electric aircraft crossing the English Channel

Highly charged aircraft design

The All Electric aircraft is still, on a commercial scale, many years away, but the trend towards the More Electric aircraft is current and ongoing. Tim Fryer spoke to Raytheon's Steve Clerkin about some of the design considerations thrown up by this trend.

Farnborough International Airshow (FIA) saw the reappearance of Airbus' E-Fan - a 2-seater all electric prototype aircraft. It may be a stepping stone to commercial viability of small electric aircraft, and perhaps a smaller step down the long path towards all electric airliners, but it is clear that such outcomes are regarded as inevitable by many in the avionics sector.

It will, however, be a long path and it is incumbent on companies such as Raytheon to develop the technologies that will be adopted as aircraft evolve with More Electric systems. Steve Clerkin is Raytheon UK's business sector lead (Aviation Electrical Power Systems), Integrated Power Solutions, and his team was launching a couple of products at FIA which he believes could play a part in this evolution.

"Boeing and Airbus have put aircraft out there that are partially electric," said Clerkin. "The 787's got an awful lot of power electronics on it and it's capable of generating 1.5 megawatts of electrical energy off its generator, for instance. For all that it is at one end of the spectrum, it's an awful lot of electricity and an awful lot of power to manage. I don't think every aircraft from now on will have that same amount of energy consumption, but the 787 has got electric systems on everything."

The drive towards More Electric comes from a need to be lighter, more efficient, more reliable and greener. But even then operators are asking for more. Clerkin said: "All of those things are what attract the operators to select which aircraft they are going to buy, but also they want an environment where it's quick to assemble, quick to maintain, and faster turnaround. That's where electric comes in."

The next generations, or replacements, for aircraft such as the Airbus A320 or Boeing 737 are those that are likely to be the ones that will feature More Electric systems. "You've got on those aircraft the number of hours, the number of people, the economics to make it worthwhile to invest in saving every kilogram of weight that you can," claimed Clerkin. "It's the operating costs that are the most compelling. So if you want to take mechanical off and put electric on, it's got to have some benefit – lighter, more reliable, easier to maintain and reduced fuel burn. So that generation is likely to be the next truly More Electric platform."

The product Raytheon was demonstrating at FIA was a primary power converter. Scalable to 90kW, this bi-directional non-isolated power supply is capable of converting 3-phase 115V AC generator supplied power into 540V DC (to meet the aircraft's varying electrical load requirements) and also converting DC into 3-phase AC for engine start duty; i.e. the generator becomes a motor. In addition, the converter utilises Silicon Carbide power semiconductors, high frequency switching and liquid cooling to minimise size and weight.

The development of the demonstration converter incorporates technology developed during a series of Aerospace Technology Institute (ATI) / Innovate UK funded projects including the Rolls-Royce led 'Siloet2' project and the Airbus led Integrated Power & Propulsion Architectures (IPPA) project, which is providing aerospace engineers with data to optimise tomorrow's

electrical systems for greater efficiency, minimised emissions and reduced operating costs. Also, IPPA has brought together UK suppliers for many of the major elements in an aircraft's electrical system, including engines, generators, power distribution and electrical loads (such as motors and actuators).

"Raytheon's role within IPPA has been to help develop a clear understanding of how the More Electric aircraft's power architecture can be modelled and subsequently optimised," said Dr Grant MacLean, technical lead for power & control within Raytheon's IPS business unit. "We're now bringing our power design expertise, which ranges from semiconductor fabrication through to system-wide power architecture modelling, to develop fit-for-purpose, reliable and high-density power converters and other products to support the More Electric aircraft."

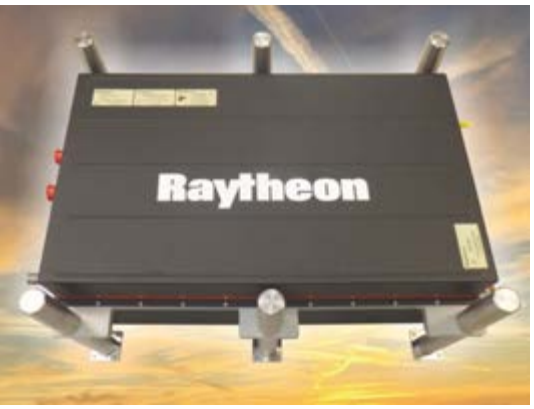
Virtual design at Airbus Group

Using virtual or augmented reality in the design process is emerging as a useful tool for assessing customer or user acceptance. But so far its use directly as a design tool is in its infancy. One company that has embraced the technology and its possibilities is Airbus, as Paul Hannah, creative director of future concepts, explained: "There are applications already that allow you to edit and work within the 3D environment and create a model, all within that. There is a possibility to allow a customer to go into a cockpit or into a cabin and allow them to be modifiable in real time."

The programme Airbus Group uses is Unity, which is primarily a games engine. "It's a very powerful engine and allows for very quick prototyping," continued Hannah. "It allows for very quick build times and then you can take that information, export it and then use it inside the CAD environment for more rigorous testing. But all of those systems like Unity and Unreal Engine have mechanisms to allow the designers to go in and actually work within the 3D virtual space."

Andrew Anderson, who is COO of the company's Corporate Technology Office, commented: "I think what we're doing at the moment in virtual reality is really exciting. Understanding how we can use products in the future, how we come together with customers to find requirements for missions and products - those are really good things.

"We use it as a design tool. We use it in defining mission situations with customers. And we use it also in maintenance scenarios as well. So there are three areas at the moment that it's being used in and growing very fast."



The Boeing 787 Dreamliner (right) can generate 1.5MW off its generator. (Above) Raytheon's primary power converter utilises Silicon Carbide power semiconductors to minimise size and weight

Raytheon believes it is out on its own in terms of power conversion and power conditioning in such harsh environments. Clerkin observed: "Some of the other businesses in trains and transportation and so on are probably doing equivalent systems but not in the same harsh environment, and certainly not the same altitude, temperature range, EMC and EMI challenges that we have to overcome on an aircraft. Those industries can do great power conversion, but they don't have all of the restrictions that we are exposed to in aerospace.

Current designs are aimed at the More Electric aircraft. "What we have to have is scalable equipment," claimed Clerkin, "so we don't have to redefine every time. We can design something that will deliver 100kW or we can scale it up to a couple of hundred kilowatts and that's probably good enough for what the market needs today."

However, to get the architecture working on the aircraft it requires collaboration with other supply partners, as Clerkin described: "There is no point of designing in isolation. An electrical system should be treated like an entire system end-to-end, from a generator all the way to the galley. Certainly for the major loads like wing de-icing and air conditioning, you have to understand the behaviour of the entire system for you to be able to design the right equipment and optimise your equipment throughout that design cycle. If not, you'll get 15 or 20 people who are all designing in isolation and everybody will build in redundancy and your equipment will be possibly twice the size and weight that it needs to be for the aircraft.

"So collaborative efforts, working with innovative planners and people that want to come together to put a compelling bid together, that's the way to really put a system together for tomorrow's More Electric aircraft."

ENGINEERING DESIGN SHOW

CONFERENCE | EXHIBITION | WORKSHOPS

19 - 20 OCTOBER 2016
RICOH ARENA | COVENTRY

SHOW PREVIEW

Making the most of EDS

HEADLINE SPONSORS

Altium · Digi-Key · IC BLUE · Mentor Graphics pads · premier eda solutions · RS

Hybrid event for engineers to enjoy

What projects would you like to find out more about? Projects that you could either learn from for the benefit of your own design work, or just want to know more about because you are an engineer and you're interested? You may well find them at the Engineering Design Show.

PUT IT IN YOUR DIARY
19 – 20 October 2016
Ricoh Arena, Coventry

PREVIEW CONTENTS

OPENING TIMES
Wednesday 19th October
10:00 – 17:00
Thursday 20th October
10:00 – 16:00

@EngDesignShow
#EngDesignShow

engineering design show

What about the new Hydradig from JCB. To some it may be a yellow bit of construction equipment, but on closer inspection it is clear it is like no other multipurpose digging/moving/lifting machine. For one thing it has excellent visibility, is more powerful and is more stable than much bigger excavators. So how does it do that? How have they engineered a machine with completely different specifications (and centre of gravity!) than anything before it? The answers will be revealed in a keynote presentation at the *Eureka* Conference during the Engineering Design Show (EDS). What makes EDS so special is that the actual Hydradig will be at the show for engineers to examine at their leisure.

The same is true of Elemental's Rp1 sports car that is at home on the road as it is on the track. Advanced aerodynamics have resulted in a novel seating position that changes the whole design of the car. It's great to hear about it in the conference, but even better to go and see it for yourself on the show floor.

EDS therefore is a hybrid event. There are exhibitors spreading the word about their wares and their technologies, some of which will be further explored in the workshop programme. The conference schedule takes a broader look at the inspirational projects and trending technologies, and both conference and workshop programmes will be discussed on the following pages. EDS also runs alongside its sister Electronics and Embedded Design Shows, reflecting the ever diversifying nature of an engineer's remit.

This year's Innovation Zone will not only include the Elemental RP1 car, but also an interesting 3D printing solution from the Manufacturing Technology Centre and a deployable space boom from Oxford Space Systems. This is the company that won the Grand Prix at last year's British Engineering Excellence Awards.

New this year will be the Future Zone, which will highlight the growing impact that virtual reality is making on the engineering sector. There will be working demonstrations so that visitors can experience what a fully immersive design environment looks like. Final details of the Future and Innovation Zones will be published in the October issue of *Eureka*.

EDS is designed to be as interesting, informative and useful as possible for design engineers – come along to find out for yourself. Everything, from the car parking to conference sessions, is free, but register now for your entry ticket and for specific workshop and conference sessions to guarantee a space.

www.engineering-design-show.co.uk.

Tim Fryer, Editor

Success – from SPORT to SPACE

Elemental's Rp1 car features an unusual seating position to give it supercar performance - Thurs 9.15am

ENGINEERING DESIGN SHOW

A central and much anticipated feature of EDS is the conference programme. Tim Fryer unveils what is on this year's agenda

So many of Team GB's returning Olympic heroes paid tribute to the support structure put in place by UK Sport – a structure that has adopted a broad view of what it takes to give our athletes the winning edge on the biggest sporting stage.

Part of this has been a scientific and engineering approach, sometimes to improve equipment but more often to improve training and performance. UK Sport's partner for this was BAE Systems, and a presentation about this partnership and how British engineering contributed to Team GB's record breaking medal haul, will be one of the highlights of the conference programme.

This is one example of why the Engineering Design Show's conference regularly attracts engineers that otherwise might have stayed back at base, a slave to the workstation. This conference does aim to tackle some of the most pressing technical issues in engineering – 3D printing, advanced materials, virtual reality and other leading edge design tools, the growth of the Internet of Things, and more. But beyond addressing these leading edge issues, it also takes a look at the leading edge projects. For example….

JCB has taken a top-down approach to innovation and its new strategy has yielded products that are disrupting the construction and agricultural markets they are aimed at.

Elemental has developed an astonishing new sports car that can reach 60mph in 3.2 seconds, using only a 1 litre engine. If you think this must be made out of thin air, think again. It is safe (they assure me), is road legal and even has a luggage compartment big enough for the weekly shop.

And Oxford Space Systems, winner of the coveted British Engineering Excellence Grand Prix Award in 2015, will convey some of the excitement around the UK's space industry at the moment by talking about designing for such a rarefied environment.

Coupled with the in-depth technical presentations in the workshop theatre, there are plenty of reasons to make the trip to Coventry this October.

All conference and workshop places are free. To guarantee your place you can book individual sessions – as many as you like – by registering at www.engineering-design-show.co.uk.

Optimised design can start at the beginning of the design flow, rather than the end - Wed 12.15pm

Britain's Olympic team performed brilliantly in Rio, but it wasn't without engineering support - Thurs 10.15am

Designing to make the most of 3D Printing - Wed 11.15am

Industry 4.0 is starting to happen - Weds 10.15am

EUREKA CONFERENCE

WEDNESDAY 19TH OCTOBER 2016

09:15

JCB: A story of successful innovation

Tim Burnhope, Chief Innovation & Growth Officer, JCB

JCB's success as a global construction and agricultural equipment manufacturer over the past 70 years is built on innovation. Now the company is writing a new chapter in its innovation story with the launch of the revolutionary new JCB Hydradig. This is a product which has innovation running through its veins and is set to revolutionise the way jobs are done in urban environments, on construction sites and on busy road networks around the world. Developed in complete secrecy over a three-year period under the codename 'Project 710' the result is a product which rewrites the rulebook.

10:15

Connected Industry i4.0 Machines: from the nuts and bolts to the Cloud

Mike Lomax, Head of Product Management, Bosch Rexroth

Industry 4.0 means different things to different people, and there are many stages that an Industry 4.0 solution can evolve through before it can be viewed as a full implementation. This session will discuss what are the components of an i4.0 solution, the role of data and communication, and what are the practical considerations when designing an Industry 4.0 solution now. In other words, Real World Connected Industry i4.0.

11:15

Designing for the freedom of Additive Manufacturing

Andrew Triantaphyllou, Principal Engineer, Design for AM, Manufacturing Technology Centre

AM is a niche manufacturing process that is already being used to make end-use parts in many industry sectors. But if you want to use it, how should you design for it? This presentation will give examples of when and why AM is a good choice of manufacturing method, and also the new mindset, workflow and software that is needed to design for it. Standards and online resources will also be presented, plus expected near term developments in design for AM.

12:15

Panel Discussion: Challenging conventional design processes using advanced design techniques

A panel discussion covering challenging conventional design processes using advanced design techniques. Among the technologies under discussion will be the 'pre-design' technique of topology optimisation, and the increasing use of virtual and augmented reality in the design process.

The panel will be chaired by Tim Fryer, Editor, Eureka magazine and include:

Martin Gambling, Managing Director, GRM Consulting

Paul Haimes, PTC/Vuforia

14:15

Running successful apprenticeship programmes

SEMTA – The Science, Engineering, Manufacturing and Technologies Alliance

Apprenticeships have gained popularity recently from all quarters. Young people, daunted by the costs involved in undergraduate study are more open to training this way. The Government has proved a keen supporter of apprenticeship programmes. And companies are able to train staff to meet their needs, while improving the skills base throughout industry. It still takes careful planning and delivery to create a successful programme and this presentation will address those issues.

THURSDAY 20TH OCTOBER 2016

09:15

Designing, selecting materials and honing aerodynamics for the next generation of sports car

Guy Colborne, Design Manager, Elemental Motor Company

Elemental, a company set up by a small team of highly experienced race car engineers and automotive designers, has spent the last six years creating the Rp1, a highly innovative, lightweight, road legal track car. Featuring an intelligent design philosophy that ties five key design concepts together, the Rp1 offers a combination of technology and a user experience not seen outside the most extreme of supercars or high end racing cars.

10:15

Engineering success in sport

Henry White, Lead Technologist: Sensing, BAE Systems

BAE Systems is UK Sport's Official Research and Innovation Partner, enabling British athletes to achieve sporting excellence through the application of cutting edge technology and engineering solutions.

The technology partnership between BAE Systems and UK Sport has benefited more than 30 different sports and 250 Olympic and Paralympic athletes since its conception in 2008. There are specific design and engineering challenges in transferring technology to the sports arena. This presentation will give an overview of the partnership and discuss some of the specific projects where design has been paramount.

11:15

The British space industry and development of deployable structures

Mike Lawton, CEO, Oxford Space Systems

Deployable structures such as antennas, solar panels and boom systems are essential parts of every satellite. These critical structures need to satisfy a range of conflicting commercial and technical requirements, for example; be structurally stiff but very light weight, large when deployed but stow in a very small volume etc. This highly visual and engaging talk from Oxford Space Systems founder & CEO, will introduce and demonstrate some of the design techniques and novel materials – such as origami and flexible composites – used to tackle the challenges of achieving large structures in space.

12:15

Designing products for the connected world

Matt Lacey, Senior Chartered Engineer, Cambridge Consultants

There are already around 20 billion things connected by the Internet of Things. Estimates vary, but a consistent figure is emerging of 50 billion such devices by 2020. Successful design for this environment takes more than just putting a sensor and a comms chip on each device – the approach needs to be far more considered, as this session will discuss.

13:15

Panel discussion: The advanced materials that are changing modern engineering

New metals, composites and other advanced materials are offering designers new possibilities, but adoption – both of the materials and the processes used produce them - can be a brave but important move. This panel will look at these materials and processes and the opportunities they offer.

This panel will be chaired by Justin Cunningham, Editor of Engineering Materials magazine.

Panelists include:

Iain Todd, GKN Aerospace

Stratasys

Workshop Programme

WEDNESDAY 19TH OCTOBER 2016

10:15

How to design energy efficient connected 'smart' products using engineering simulation

Dr Maciej Ginalski , UK Technical Manager, ANSYS UK

11:15

Understanding the benefits of thermoplastic composites for automotive lightweighting

Craig Norrey, TPC Global Technical Service Manager, Dupont

12:15

High performance at low cost – new materials for optical demanding functional parts

Martyn Jocelyn, Area Sales Manager, KD Feddersen

13:15

Realise additive manufacturing in your organisation today

John Williams, Sales Manager UK, Materialise

14:15

Lose weight, gain £s with engineering polymers

Howard Bradfield & Steve Allen, Materials & Applications Engineer, Nylacast

15:15

Efficiently screening PCBs for SI, PI and EMC issues

Steve Gascoigne, Senior Consultant, Mentor Graphics

THURSDAY 20TH OCTOBER 2016

10:15

Semi-crystalline engineering polymers: harnessing the benefits for better design

Bryan Morris, Industrial Designer, Dupont

11.15

Successful product evolution

Damian Hennessey, Director, ProtoLabs

12.15

IoT solutions using LoRaWAN

Jonathan Pearce, EU Marketing Manager, RS Components/Microchip

13:15

Realise additive manufacturing in your organisation today

John Williams, Sales Manager UK, Materialise

14:15

Running hot? Electronics design analysis for efficient cooling

Steve Gascoigne, Senior Consultant, Mentor Graphics

Sessions presented by industry leaders such as:

ANSYS®

DUPONT®

K.D. FEDDERSEN
Think Value

Materialise
innovators you can count on

Mentor Graphics pads
personal automated design solutions

NYLACAST
ENGINEERING PLASTIC SOLUTIONS

proto labs®
Real Parts. Really Fast.™

RS

That EXTRA spark!

Co-locating with the Engineering Design Show are the Electronics and Embedded Design Shows. As Tim Fryer reports, these bring an interesting dimension for the visiting engineer.

ELECTRONICS DESIGN SHOW

EMBEDDED DESIGN SHOW

Engineers rarely have the luxury of concentrating on a single discipline. In particular, the tidal wave that is engulfing product development, otherwise known as the Internet of Things, is ensuring that every mechanical engineer needs to keep one eye on electronics so that products are developed with the ability to interact in some way. Often this means using an app on a smart phone to do something that would be much more easily done manually, but not even common sense can stop a tidal wave!

Electronics is therefore very much a part of the mechanical engineer's world, and in fact the more generic term of design engineer generally provides a suitable umbrella for all.

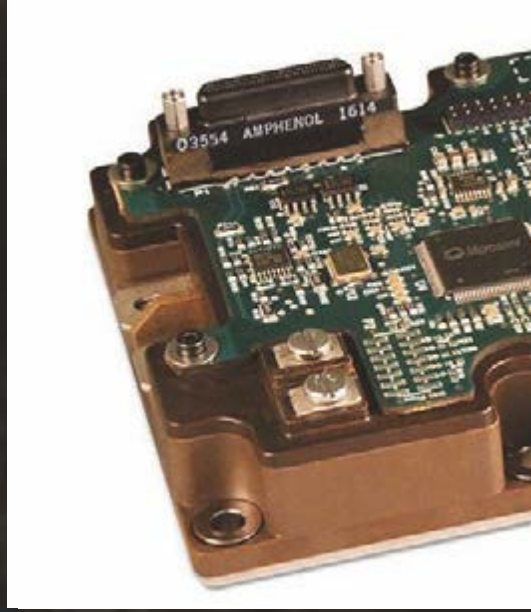
Co-locating the Engineering Design Show with the Electronics and Embedded Design Shows therefore makes a lot of sense. Electronics engineers have their domain at the event, and mechanical engineers have theirs, but there is a healthy cross over where the design engineering community can confer on matters of mutual interest, all under one roof.

In fact, some themes emerge in every sector of the design engineering community. Internet of Things, obviously is one, but there are many others and some of these will be covered in the New Electronics Conference programme. Wearable electronics is one example where the electronics technology makes it possible, but it still requires the mechanical design to make it practical. It will be interesting to hear what TUV has to say on the subject in the last presentation on the opening day.

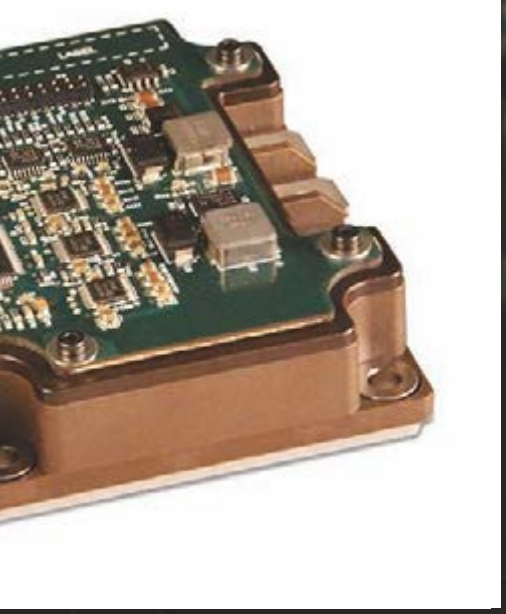
Another interesting presentation that is topical across the engineering community will look at the role of augmented and virtual reality in the design process. Plextek will look at the impact this technology has had to date, and how lower cost technology is emerging that could make it more accessible.

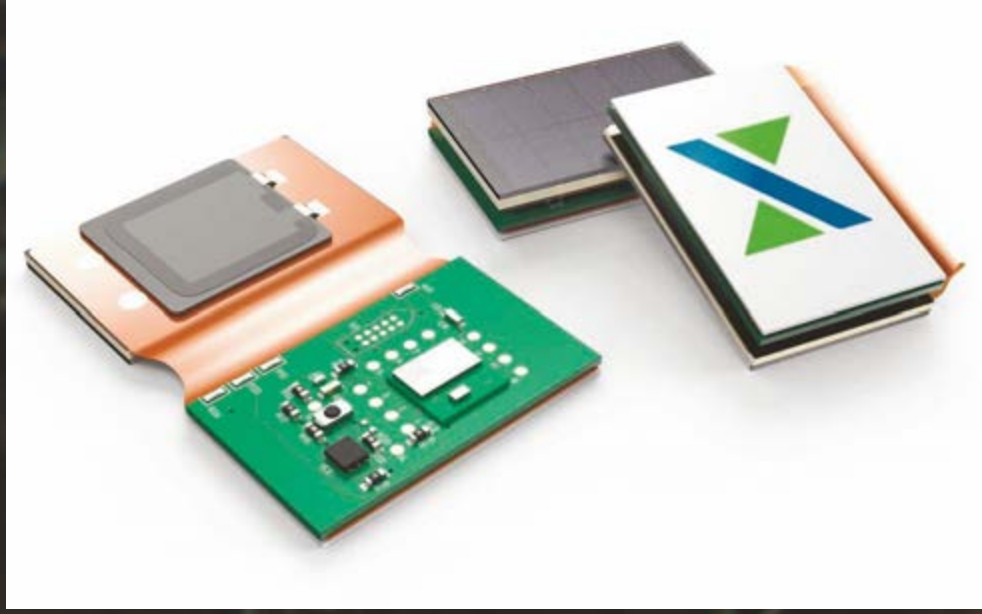
More electric aircraft is another of those topics that require a multi-discipline engineering appreciation. Relying on electronics and electrics, which can have issues at high altitude, allows a substantial reduction in weight. So too can the use of advanced materials and this combination can alter the potential shape, wingspan and structure of the aircraft. A session from Microsemi will describe the architecture of a power drive electronics unit which controls an electrical motor in application areas such as primary flight control actuation, landing gear and braking systems. Such developments are essential if the electrics in aircraft are to become 'more'.

To pick out one more from an excellent programme, the keynote on the second day will be a presentation from Dave Honess, educational resource engineer, Raspberry Pi. The Raspberry Pi has been a phenomenal success on many levels, including as a development board for mechanical engineers dabbling around adding some control or communications to their designs. It has also been a great educational tool and a school project tied in with Tim Peake's experiments on board the International Space Station. This presentation describes how the project was



A power drive electronics unit for the More Electric aircraft





Ilika's fit and leave for life solutions for IoT products

Pi in Space - Find out about Tim Peake's Raspberry Pi experiments

IoT security: Keeping embedded systems secure

New Electronics Conference Programme

Wednesday 19th October 2016

09:15
A Game of Drones: What keeps drones in the air?
Will Brown, Senior Director Product Marketing, Qualcomm

10:15
Technology enabling more electric aircraft
Shane O'Donnell, Aerospace Product Development and Technology Manager, Microsemi

11:15
How can AR and VR applications be deployed in design and manufacturing?
Collette Johnson, Director of Medical & Healthcare, Plextek

12:15
Panel Discussion: The future with FPGA
Panel discussion chaired by Adam Taylor, Chief Engineer, e2v

14:15
PCB design best practice
Ian McCormick, CAE/CAD Section Manager at Abaco

15:15
The latest technology and design considerations for wearable electronics
Richard Poate, Compliance Services Manager, TUV SUD

Thursday 20th October 2016

09:15
Pi in Space: Tim Peake's journey to the ISS and the Raspberry Pi he took with him
Dave Honess, Educational Resource Engineer, Raspberry Pi

10:15
IoT Communications - barriers to achieving 50 billion IoT devices
Prof William Webb, CEO, Weightless

11:15
IoT Security: Keeping embedded systems secure
Sakir Sezeb, Director of Research - Networked Systems Security, Centre for Secure Information Technologies

12:15
Future battery technologies and potential automotive applications
Graeme Purdy, CEO, Ilika

13:15
Can autonomous vehicles ever be smart enough?
Tom Wilson, Product Line Manager, ADAS Radar Products, NXP Semiconductors

14:15
A guide to adopting cyber security in automotive applications
Paul Ewers, Senior Manager, Engineering Quality, Visteon

achieved and what the students got out of it.

There are also workshop theatres located in both the Embedded and the Electronics sections of the show, and the content here will be excellent for those who know their stuff, but may be a bit beyond those who are rookies in the world of electronics. A full programme is on the website.

Beyond the presentations, there is a wealth of knowledge within the electronics and embedded shows. Some companies, like National Instruments, will be familiar to many design engineers already, as will the big distributors like RS Components. However, what may be interesting is the expertise in some of the smaller companies who offer third party services. In the past there was a host of 'board stuffers', who would provide the electronics that the customer had ordered, whether it worked or not, or was good or bad.

Such companies are few and far between now and in their place has evolved companies

who go under the collective banner of Electronics Manufacturing Services providers. Often these services include not just design for manufacture advice, but also original design services, and this can make them a useful partner for engineering companies looking to import a bit of electronics expertise.

www.engineering-design-show.co.uk

Entry to the Electronics and Embedded Design Shows, and the conference and workshop sessions, is free. Engineers visiting the Engineering Design Show do not need to reregister for the other events. Advance booking for New Electronics conference or workshop is recommended to ensure a place.

Weidmüller

Panel building requires innovative ideas
Klippon® Connect delivers pioneering connectivity solutions
Let´s connect.

Imagine you were able to plan more quickly and work more efficiently thanks to customised application products. As a pioneer in industrial connectivity, we are always looking to go one step further. With Klippon® Connect, we have developed a precise portfolio of solutions based on the various fields of application within the panel. This allows you to plan recurring applications more easily and carry out complex projects more efficiently. From planning through to installation and operation.

Sales: 0845 094 2006 **Tech:** 0845 094 2007
Email: marketing@weidmuller.co.uk
www.klippon-connect.com

Let´s connect.

Eureka Knowledge

is a free online resource for the discerning design engineer

Eureka's Knowledge provides useful content and tools to help make your designs more efficient, cost-effective and commercially successful.

In the first of a series of topics, Eureka has teamed up with simulation experts ANSYS and COMSOL to explore simulation, which is of integral importance to a vast range of projects and industries.

Used at the right time and in the right way, simulation can reduce design time, help identify potential failures earlier in the product development cycle and enable simulated tests that might not otherwise be possible.

- *News*
- *Videos*
- *White papers*
- *Events*
- *Blogs*

EUREKA KNOWLEDGE

Increase your knowledge
www.eurekaknowledge.co.uk

Content partners

ANSYS COMSOL

Well worth your while

Time is a precious commodity for design engineers due to deadline pressures and constantly changing market requirements, among other factors. Yet with the diverse range of technologies, materials, components and processes available it is important to be able to take time out to learn and review what's new and how you can benefit.

Now in its fifth year, EDS continues to offer visitors the opportunity to meet and do business with more than 200 exhibitors. These exhibitors will be only too happy to share their knowledge and expertise to help with your project. We asked a selection of them to give a brief overview of who they are and what they will be displaying at EDS 2016.

ABSSAC

ABSSAC will be displaying its range of cold rolled formed miniature ball screws at this year's Engineering Design Show. The uniqueness of these linear devices is that they utilise precision ground ball nuts, which then operate with precision cold rolled formed screws. The ball screw and nut combination delivers an accuracy close to a precision ground screw but with considerable cost saving.

Coda Systems

Coda Systems will be demonstrating the Swift-Dock-Power, its high current, spring loaded docking station connector array addition to its Swift-Dock family. A spring loaded pin with a through-pin construction allows Swift-Dock-Power to handle a current load of up to 10A. This makes it ideal for many power and battery charging applications. It can also be used in rugged environments where vibration may cause open circuits and overheating of a standard spring loaded pin.

CeraCon

CeraCon will be showcasing its contract gasket business at EDS 2016. Its high performance 2D or 3D foam seals can be tailored for both hardness and physical size – as they're applied. So customers can create unique areas of compression on the joins they wish to seal with bead widths from 1.5mm wide up to and above 20mm. For those higher volume customers, CeraCon design and manufacture complete foam application cells. At the Engineering Design Show, CeraCon will be offering a free-of-charge sample service for those customers interested in evaluating this technology.

Bosch Rexroth is driving the next industrial revolution as a leading automation supplier and manufacturing company. With a huge automation portfolio and production experience from our own plants worldwide, we can offer leading automation and manufacturing solutions – from single piece to high volume production.

Connected automation in manufacturing leads to a faster and more flexible production process, greater efficiency of material, and reduction of complexity and downtime.
We move everything: Let Bosch Rexroth help you connect to industry 4.0. Now!

boschrexroth.com/connected-automation

The Drive & Control Company

Rexroth
Bosch Group

Cognet Technology

In 2014 Cogent's management team performed a review of the business. What started out as a way of 'knitting' other systems together developed into a fully centralised, integrated monitoring and planning system: MaPS.

MaPS runs the length and breadth of the organisation, allowing total visibility of performance; from quote turnaround timescales to on time delivery performance and KPI's.

MaPS has revolutionised quality; by embedding QMS systems, productivity and consequently on time delivery, bringing benefits to the company, its stakeholders and most importantly, to its customers. Visit Cogent at EDS 2016 to understand how MaPS could benefit you and your customers.

CST

As well as a stand, CST is holding a workshop on Wednesday 19th October at 14:15 in Workshop Theatre 2 at EDS 2016.

The workshop will give an overview of the simulation capabilities within CST STUDIO SUITE for EMC/EMI analysis of high speed electronics. The integration of 3D and circuit solvers offers the workflow for simulating the effect of the switching elements in the 3D environment which is critical for accurate analysis of power electronics and digital electronics. CST will also discuss some automotive applications where simulation was used for troubleshooting EMC issues.

Digi-Key Electronics

Digi-Key Electronics is bringing technical personnel from the USA and Germany to provide on-demand demonstrations of the use of its website and will demonstrate its offering of both free and subscription EDA tools.

Those interested in motion control technology, especially those trying to implement coordinated motion control between several axes over an intranet or the internet, will appreciate disclosure of an original technique that reduces communication bandwidth requirements. This technique also eliminates infinite jerk, is superior to s-curves and spines, and can be implemented in many non-proprietary devices.

DuPont Performance Materials

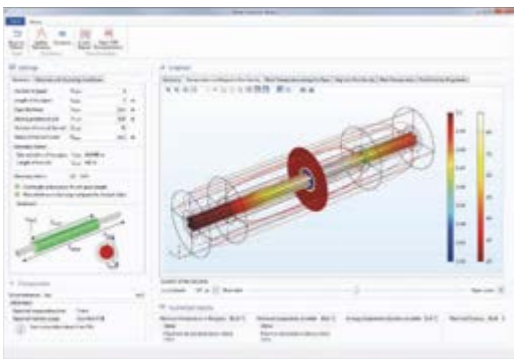
DuPont Performance Materials will be hosting two workshops at the upcoming Engineering Design Show event covering the following topics; "Designing with Semi-Crystalline Engineering Polymers" and "Thermoplastic Composites for Automotive Lightweighting." In addition, DuPont Performance Materials invite you to visit stand D40 where the team will be showcasing a number of applications (including automotive, medical and sports goods) that are putting smart design with engineering polymers into practice.

Electro Mechanical Systems

EMS will be displaying three new products from FAULHABER at this year's Engineering Design Show. The 2668 CR DC motor is claimed to be the most powerful copper-graphite commutated DC micromotor in its size class on the market. Featuring a larger NdFeB magnet and a high copper content in the winding, it delivers a continuous rated torque of 0.07Nm.

The medium power, compact 1727 CXR DC micromotor features a powerful neodymium magnet and graphite commutation resulting in high power density from a 17mm diameter with a continuous torque of 0.0049Nm.

The 20/1R planetary gearhead is said to be the most powerful power gear transmission technology in its size class. In a diameter of 20mm, the stainless steel construction achieves a continuous torque of 0.8Nm, and up to 1.100Nm for intermittent applications.



COMSOL

COMSOL is exhibiting COMSOL Multiphysics version 5.2a at the upcoming Engineering Design Show, and will be offering live demos of the software including its Simulation Application Builder functionality.

This release represents a huge step forward in how simulation apps can be shared using COMSOL Server. With these solutions, COMSOL claims it is making it easier for engineers and scientists to use and access the power of multiphysics simulation. This is done by offering the tools to create an easy-to-use simulation app out of any COMSOL model, then provide the platform to share this application with colleagues and customers.

elobau

elobau will be showcasing its machine safety, level measurement and operator controls range of products. One of the products on display will be its range of eloProtect machine safety sensors. These compact and robust safety switches are available as either the magnetically actuated eloProtectM or the RFID actuated eloProtectE; both offer increased tampering protection and sensing distances, which together with the IP6k9k housing make them a cost-effective choice.

GGB Bearing Technology

GGB is the world's leading manufacturer of high performance, self-lubricating and prelubricated bearings. The company serves more than 30,000 customers worldwide in a broad spectrum of applications and industries including automotive, fluid power, agricultural and construction equipment, sports and recreation equipment, renewable energy, primary metals and general industrial. Its product offerings include metal-polymer, engineering plastics, fibre reinforced composite, metal bearings and bushing blocks. Also provided are R&D and testing capabilities, flexible manufacturing, technical support and a global network of distributors.

Gresham Power Electronics

Visit the Gresham Power Electronics stand at EDS and register a qualifying project to receive a free sample of the new EOS 225W low profile, high efficiency (M)WLP225 - suitable for both industrial and medical applications. Gresham now provide a range of open frame and external power supplies from EOS and SL Power in addition to flexible CompactPCI power supplies for instrumentation, MIL and railway applications and have over 60 years' experience of providing custom defence power solutions worldwide. Standard power supplies are also available.

GSM Graphic Arts

GSM Graphic Arts will be showing examples of digitally printed aluminium nameplates and control panels produced using its specialist 'print into metal' label technology at EDS 2016. This process enables multi-coloured images to be printed into the preanodised surface of the aluminium which is then sealed to provide a hard wearing and solvent resistant finish that is suitable for interior and exterior applications.

This is just one of the range of bespoke labelling processes offered by GSM Graphic Arts. This range includes roll form vinyl labels to screen printed polycarbonate and polyester graphic overlays, etched stainless steel nameplates to metal enclosures, resin domed logo badges to 3D embossed aluminium logos.

Harmonic Drive will be showcasing its range of servo actuators and gears at this year's EDS. The products on display are suited to support design engineers creating innovative solutions for applications across robotics, automation, medical, defence and aerospace sectors.

The CanisDrive range of compact hollow shaft servo actuators incorporates the company's newly developed high capacity drive bearings. This means that the external load can be directly mounted without the need for additional bearings or support. As a result, the CanisDrive line is lightweight and more compact, without compromising the gear's high precision.

Heico Fasteners UK

Heico Fasteners UK will be making its maiden appearance at EDS with its HEICO-LOCK range of bolt fastening products. This range is based around the original Wedge Lock Washer, consisting of a pair of washers with internal wedge shaped cams and external radial teeth, that use tension instead of friction to maintain a bolted joint's pre-load force even under the most severe vibration or dynamic load.

The 'Ring-Lock' system incorporates a Polyamide ring that holds the pair of washers in place permanently.

Henkel

The merits of structural bonding over conventional joining techniques, optimised joint design and the latest developments in structural adhesives will be Henkel's main focus at EDS 2016.

From train carriage construction and recreational vehicles, through to lift doors and electric motors, the applications for structural bonding are huge and growing. As well as allowing dissimilar materials and composites to be joined, Henkel structural adhesives provide many performance benefits.

Among the products in this category is LOCTITE 4090, a hybrid material combining the rapid fixture setting properties of cyanoacrylate superglue with the excellent chemical and temperature resistance associated with epoxies.

It's time...

...to unveil the winners of this year's

british engineering excellence awards

Join the best of British engineering as the winners of the 2016 British Engineering Excellence Awards are revealed....

Where:
The Honourable Artillery Company (HAC), London

When:
6th October 2016, 11.30am

What:
Champagne reception followed by a 3-course lunch

Host:
Steph McGovern, TV presenter and journalist

Reserve your place now and join us as we celebrate British innovation and engineering at its very best

Book your place now at: www.beeas.co.uk

*ticket prices includes champagne reception, 3-course lunch and half a bottle of wine per person.

Headline sponsors

Cambridge Consultants

Gallery sponsor

RS

Category sponsors

maxon
maxon motor uk ltd

premier
eda solutions

HepcoMotion

At the Engineering Design Show, HepcoMotion will showcase a range of products that can meet practically any requirement from linear to circular, and heavy duty to XYZ systems. HepcoMotion offers over 42 major product lines with thousands of individual components in various sizes.

Key products on the stand will include the GV3 Linear Motion System that serves a diverse range of automation and linear applications.

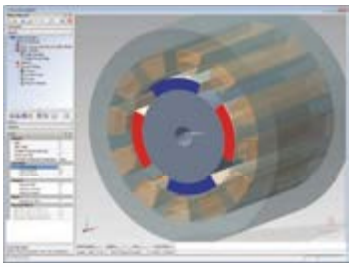
Further products on display will be the DTS2 driven track system for high speed and dynamic applications. Visitors to the stand will also be able to see the low-cost, high-quality Hepco Linear Guide System that is suitable for most automation requirements.

Hirose Electric

At EDS 2016, Hirose Electric will be displaying products with a particular focus on the industrial market for many applications such as, programmable logic controllers, FA robots, FA cameras, FA controllers, industrial LAN interfaces, servo motors, medical and many others. The new IX series is a compact yet high-speed connector that provides a robust LAN interface connection for industrial equipment. New FPC/FFC connectors with high operation, one-action locks that allow easy and automated FPC/FFC insertion, which will be a main feature on the stand.

The FunctionMAX board-to-board range of connectors with floating structures and high-speed transmission capability will also feature alongside the compact, Enerbee, high power, wire-to-board connectors with strong positive locks.

Infolytica



Infolytica offers state-of-the-art 2D/3D Electromagnetic simulation software for magnetic, electric, and thermal analyses. Engineers from a range of industries use Infolytica's software to design and analyse applications including electromechanical devices, non-destructive testing, induction heating, and industrial transformers.

In addition, Infolytica offers MotorSolve, an innovative design tool for IM, SRM, Brushed and Brushless DC motor and generator design, and an add-on to SOLIDWORKS containing many of the features of the 3D magnetic analysis software. Visit Infolytica's stand to find out more about the new Generator version of MotorSolve, and the new features included in the recently enhanced SOLIDWORKS.

JET PRESS

JET PRESS technical consultants will be on hand at this year's Electronics Design Show to discuss the extensive JET PRESS product and service capability which includes product design, 3D Printing, 3D CAD models, sampling, manufacturing and stockholding.

JET PRESS will be presenting its Industrial Components catalogue and their Hardware brochure featuring Accuride ball bearing slides, Access solutions and Camloc gas springs. Additional products being showcased include Teconnex specialised jointing solutions comprising of V-clamps, band clamps and slip joint assemblies.

Kemtron

Kemtron will showcase its low density PET and polyurethane foam and flame retardant conductive elastomers at EDS 2016.

The conductive foam is copper and nickel coated giving low resistance electrical conductivity and providing excellent EMI shielding performance when used as an EMI gasket. The foam can be die cut to bespoke shapes or slit for gasket applications such as I/O panels, backplanes, connectors, access panels, etc. The flame retardant material consists of nickel coated graphite loaded into silicone elastomers. Its performance in many applications exceeds silver based products.

KD Feddersen

KD Feddersen will be highlighting its expanding thermoplastics range with the addition of polypropylene compounds from Washington Penn. It is also building its Akromid brand of polyamides with some specialised highly glass reinforced reduced moisture grades that are now used on internal parts in a number of Volkswagen cars. With its 'ICF' carbon-fibre-reinforced compounds, KD Feddersen has realised a number of serial applications that actively contribute to lowering CO_2 emissions, and some of these components will be on display.

Lati

The Lati stand at EDS 2016 will include an engineer ready to discuss feasibility of potential metal replacement projects. The company will highlight successful projects including a demonstration of LED lights utilising heat sinks made from LATICONTHER thermally conductive compounds, which have replaced the traditional use of aluminium at considerably lower cost and improved design flexibility.

Demonstrating a 90% weight saving, there will be an original brass moulding and the plastic replacement made from the glass reinforced LATIGLOSS plastic compound for use in a shower mixer valve, pressure resistant above 15 bar and approved for potable water.

LG Motion

If you have a requirement for a complex application, LG Motion's engineering team will be on hand at the Engineering Design Show to advise how customising a solution to your needs is possible.

LG Motion rotary and linear stages can be combined with servo and stepper drives and motion control components and systems supplied by a number of key global partners.

To complement LG Motion's own product range the company has long standing partnerships with key global partners such as Arcus Technology, Airex, Precision Motion Dynamics, Velmex, Heidenhain, Schneeberger and Empire Magnetics.

maxon motor

maxon motor will be displaying its motors, gearheads and controllers at this year's Engineering Design Show. maxon's engineers have years of experience in assisting customers with their projects. From space to tattoo machines, robotics to drilling, the company has expertise in a range of applications and industries.

maxon prides itself on quality and maintain the following certifications ISO 9001, EN 9100 for the aerospace industry and ISO 13485 for medical technology.

Micronel

Micronel will be showcasing its most powerful high performance radial blower. The U85MX radial blower can produce up to 16000 pascals of static pressure and up to 1000 litres per minute free blowing airflow all in a package size under 85mm diameter. Combining high performance in a minimum of space, the 24Vdc U85MX blower is capable of high rotation speeds up to 46000rpm, dynamic speeding up and braking combined with minimal noise. Operating in a voltage range of 15 to 24Vdc the efficient energy saving 125W BLDC motor only draws 2.5 to 8.5A depending upon working point.

Microlease/Keysight Technologies

Visit Microlease to see the latest Keysight test solutions including oscilloscopes, signal analysers, spectrum analysers, DC power supplies, data acquisition units, digital multimeters, handheld test tools and thermal imagers. Microlease is an Authorised Premium Distributor in the UK, able offer products from stock quickly as well as expert technical advice.

The Microlease and Keysight team will be available to discuss your needs and get a demonstration. Also available are some freebies and a free prize draw to win a Keysight DSOX2022A InfiniiVision Oscilloscope worth £2,000.

Midas Pattern Company

Midas will be showcasing its tooling systems at EDS. Midas specialises in producing large, low-volume, high-quality, polyurethane mouldings as well as offering customers the facility to create large prototypes of production materials in short timescales.

FASTrim is a low cost solution to producing even large prototypes in production materials in as little as 10 to 15 days. MRIM is a high quality composite tooling system offering low set-up costs for high-quality mouldings in volumes up to 2000 per annum. Both systems are produced in-house, are accurate and can be modified to incorporate changes in design at any stage of production.

Micro Plastics

Micro Plastics will be showcasing its DualZip nylon cable tie at this year's EDS 2016. Its design incorporates a permanent lock and the easiest to use releasable lock on the market. Another difference to the conventional cable tie is that the teeth are on the outside of the bundle diameter. This helps to prevent damage to the bundle upon tightening. This design also puts the release tab up and away from the bundle for easy access.

MiniTec

The MiniTec team will discuss how a customised solution may be the answer to your needs and show many examples of work in this field. In addition to demonstrating the modular aluminium profile system MiniTec will show MiniTec iCAD online – a CAD tool to select and configure the hardware of MiniTec modular solutions. A second calculates the deflection of aluminium profile systems and linear slideways. It will calculate values for applications in both vertical and horizontal designs making sure that the design and components used are optimised for safety and functionality.

See us at
The Engineering Design Show
Stand C15

View the video

Direct drive electronic position indicators

One item for all applications

Thanks to the available functions and to the programmable parameters, one item can be used for many applications including all shaft pitch variations, direction of rotation, unit of measure.

- Wide orientable display
- High protection class: IP65 or IP67
- Corrosion resistance: AISI 304 stainless steel bushing with Ø 14 or 20 mm reamed hole
- Long battery life: lithium battery up to 8 years

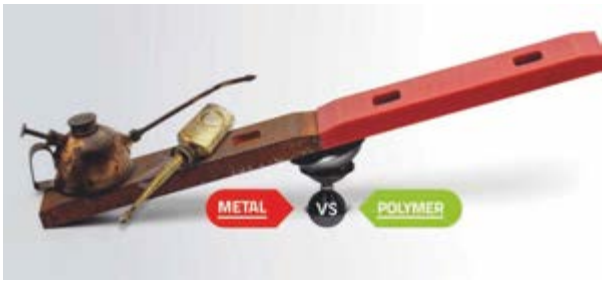
1941 - 2016
75
Elesa Anniversary

Elesa. Always more...

Operating elements | Clamping knobs | Clamping levers | Lift & Pull handles | Fixed & Revolving handles | Control elements | Indexing and positioning elements | Machine elements | Levelling elements and supports | Hinges and connections | Latches | Accessories for hydraulic systems | Castors and wheels | Connecting clamps

www.elesa.com
STANDARD MACHINE ELEMENTS WORLDWIDE

elesa®



Nylacast

Nylacast will be presenting an exclusive workshop at the 2016 Engineering Design Show highlighting the benefits of replacing traditional materials such as steel or iron, with engineering polymers proven to increase product performance, safety and efficiency without any compromise.

Attend the workshop and warm up with a short overview of polymers, before entering three training case studies on field proven engineering solutions and applications and finish with a brief Q&A session.

Visit the Nylacast stand to discover how the use of polymers can benefit your next project and product.

PARC Testing

PARC is celebrating its recent move to new premises in Bideford by running a competition from their stand. All visitors are invited to participate in its "Chopper Challenge" where the aim is to break the rotors off of a Lego model helicopter by varying the frequency and amplitude of vibration on a demonstration vibration facility.

The fastest time recorded over the two days of the exhibition will win a fabulous helicopter experience which will include 30 minutes flying time of which 6-7 minutes can be piloted by the lucky winner.

PI-KEM

PI-KEM will be displaying a range of graphene, SOFC powders, silicon wafers, sputter targets, precious metals, substrates, ceramics and ceramic adhesives. Information will also be available on its range of affordable research equipment. PI-KEM's scientific sales managers will be on hand to discuss your research requirements, technical queries and product solutions.

RDP Electronics

RDP Electronics manufactures transducers and instrumentation measuring displacement, force, pressure and torque. RDP offers LVDT displacement transducers including submersible, high-temperature and radiation-resistant designs, and these will be among the exhibits at this year's EDS.

Rutland Plastics

On Rutland Plastics stand will be a selection of injection moulded parts in a variety of thermoplastics together with examples of multi-material parts made on its Stratasys Connex 3D printer. A new service being offered by the company is 3D printed jigs for assembly and QC purposes, offering significant cost and time savings over traditionally manufactured equivalents and there will be examples available on the stand for visitors to see the potential for themselves.

Röchling

Röchling manufactures micro-machined parts that are so small you'll have a problem seeing the detail on them, or even the parts themselves. For this reason, the Röchling team is using magnifying specimen boxes to show exhibition visitors at EDS some of the tiny samples on the stand.

Röchling can manufacture components with diameters down to 0.5mm, bore sizes down to 0.1mm, wall thicknesses down to 0.1mm, tolerances as tight as 0.02mm and surface finishes of RA 0.2 microns (Ra 0.2µm).

Smallfry

Smallfry will be celebrating 45 years of turning good ideas into great products at EDS. Smallfry engineers will be on hand to help clients use design as a business tool for commercial success. Smallfry combines customer insights and commercial awareness with creative thinking to differentiate our products from our competitor's products.

Stocko Contact

Stocko will be introducing its 2.5mm RAST Eco-Tronic Crimp at EDS, suitable for use with 0.22 and 0.35mm^2 cable. This system can be mounted indirectly or, if space and cost are at a premium, directly; has a 180° cable exit; crimp design to VW60330 guarantees a stable mechanical and electrical connection; the premounted lid acts as a secondary lock; polarisation and mechanical barriers prevent mis-mating.

SimScale

SimScale is a 100% cloud-based CAE platform that lets you simulate, share, and collaborate in a community of 65,000 engineers and designers. The SimScale platform is accessible via a standard web browser, harnessing the power of the cloud and cutting-edge simulation technology to build an ecosystem in which functionality, content, and people are brought together in one place. SimScale engineers will demonstrate how to perform fluid dynamics, finite element or thermal analysis, from a normal laptop or tablet.

SUSPA

SUSPA will be displaying its height adjustment system, Movotec SpindleMotorSystem (SMS), which combines the power and reliability of the proven Movotec hydraulic system with the advantages of an electrical spindle drive. The lifting force reaches up to 150kg per table leg which equals a maximum stroke capacity of 600kg on a four-leg table. The need for a central pump is eliminated. The mechanical system works without the use of hydraulic fluid and the cylinders are suited for OEM or retrofit applications.

Technotrans

Technotrans, a company which specialises in bespoke chilling solutions for a global market, is exhibiting at the Engineering Design Show where it will be showing both water- and air-cooled products. Its R&D engineers work with design engineers to produce workable cooling technology, right down to miniaturised format. The technology has been used in airport security, test equipment, medical and transport applications.

Technotrans is attending the Engineering Design Show for a third year because this is a show that brings in high calibre designers and manufacturers and generates business.

TFC

TFC has expanded its manufacturing capabilities to allow Smalley products (which TFC supplies) down to 4mm in diameter. For over 35 years TFC have been offering these unique space saving products that can offer reductions in spring heights of nearly 50% over conventional round wire products. Examples of these products will be available to view at EDS.

SYS Systems

SYS Systems, a platinum partner to Stratasys in the UK and Ireland, will be demonstrating the capabilities of the Stratasys Objet 30 Pro, producing polyjet prototypes in a choice of eight different colours. Companies like Design Partners use the Objet 30 Pro in prototyping products such as Logitech's G502 Proteus Core, the most popular tunable gaming mouse in the world.

Thermal Issues

Thermal Issues delivers a service for bespoke interface material profiles and custom vapour chamber technologies from Celsia. Whether it's electrical isolation, vibration damping, thermal conductivity or RF absorption, Thermal Issues' direct-from-digital manufacturing is fast for custom interface pads and profiles. Now production tooling is viable for one-offs and low-volume runs.

Exhibitor list

3D Generation
3D Systems Europe
42 Technology
6SigmaET
AAV Plastics
ABSSAC
ACC Silicones Europe
Acorn Industrial Services
Active-PCB Solutions
Alfasoft
Altitek Electronics
Altium
Analog Devices
andersDX
Anglia Live
ANSYS
ANSYS SpaceClaim
Argon Design
Arrival Electronics
Assembled Electronic Solutions
Beta LAYOUT
Biesterfeld Petroplas
Binder UK
Blue Chip Technology
BVM
ByteSnap Design
Cambridge Industrial Design
CeraCon
Charcroft Electronics
COAX Connectors
Coba Precision Engineering
Coda Systems
CODICO GmbH
Cogent Technology
COMSOL
Cotsworld Plastics
CREAT3D
CST – Computer Simulation Technology
Datalink Electronics
Densitron Technologies
Design Rule
Diamond Electronics
Digi-Key Electronics
Digilent Inc
Direct Insight
Display Solutions
Dolmen Product Design
DuPont UK
E-Drive System Co.
EC Electronics
eCosCentric
Electro Mechanical Systems
Electro Rent UK
Elesa (UK)
Elma Electronics UK
elobau UK
Esprit Electronics
Eurocircuits
European Springs & Pressings
Euroquartz
EuroTech Group
Fischer Connectors
G English Electronics
G2 Innovation
Garz & Fricke GmbH
Gemalto
George Emmott (Pawsons)
GEYER ELECTRONIC UK
GGB (Formerly Glacier Bearings)
Ginsbury Electronics
Golledge Electronics
Goodfellow Cambridge
Green Hills Software
Gresham Power
GSM Graphic Arts
GTK UK
Hagiwara Solutions Co
Hammond Manufacturing
Harmonic Drive UK
Harmonic Software Systems
Harwin
Heason Technology
Heber
Heico Fasteners UK
HEIDENHAIN GB
Henkel
HepcoMotion
Hi5 Electronics
Himag Planar Magnetics
Hirose Electric Europe BV
Hitaltech UK
HITEK Electronic Materials
Hitex (UK)
IC Blue
Igus
IKO Nippon Thompson
Infolytica
Institution of Engineering Designers (IED)
IQD Frequency Products
Itron (UK)
JET PRESS
JTAG Technologies
K.D. Feddersen UK
Kemtron
Keysight Technologies
KNF Neuberger UK
Lambda Photometrics
Lascar Electronics
Laser Lines
Lati
LCL Electronics
LDD Technology
LDRA
Lee Springs
LEMO UK
LG Motion
Lincoln Binns
Lumberg
Materialise
Materials Direct
maxon motor uk
McLennan Servo Supplies
Membrane Keyboard Company
Mentor Graphics
Merriott Plastics Group
METZ CONNECT
Micro Plastics International
Micro-Epsilon
Microlease
Micronel UK
Midas Pattern Company
MiniTec UK
Molex
National Instruments
Nemco
Nexus
Nicomatic
norelem
Nylacast
ODU UK
OMC (UK)
Optris
Pacer International
Panasonic Electric Works UK
Phase One Electronics
Phoenix Contact
PHYTEC Messtechnik GmbH
PI-KEM
Pico Technology
Pneumax
Poeton Industries
Polar Instruments (EU)
Poppelmann GmbH & Co KG
PowerPax
Premier EDA Solutions
Product Assessment & Reliability Centre (PARC)
Protex Fasteners
Proto Labs
Pulsonix
Quadra Solutions
Rapid Electronics
RDP Electronics
Review Display Systems
Rhopoint Components
Robotae
Roechling Engineering Plastics and Composites
Rohde & Schwarz UK
RS Components
RUD Chains
Rutland Plastics
Samtec
SCHMIDT Technology
SCHURTER
SD Products
SimScale GmbH
SJ Electronics
Smallfry
smartboxx
SMS Machines & Automation
Solid State Supplies
Soumac Assembly Services
Spiralock (Tucker GmbH)
Springmasters
St Davids Assemblies
STMicroelectronics
STOCKO CONTACT/J-tronics
StrainSense
Strand7 UK
Stroud Metal Co.
Suspa UK
SWINDON Silicon Systems
SYS Systems
Tactiq & Maddison
TDK-Lambda
Technotrans Graphics
Telegartner UK
Telonic Instruments
Telsonic UK
tesa UK
TFC
Thermal Issues
THK GmbH
Tiro Associates
Toby Electronics
Total Board Solutions
Tracks Laser & Electronics
Trans-Tronic
Transcend Information
Twickenham Plating Group
Wavemar Electronics
Wearnes Cambion
Weidmüller
Wilson Process Systems
Wittenburg Group
WITTENSTEIN
WS2 Coatings
Wurth Electronics UK
Xentech Solutions
York EMC Services
Zuken

THK

At EDS 2016 THK will be displaying its range of linear motion guides, including the new series SPR / SPS that provides a caged ball LM Guide that features the highest rigidity and the lowest waving among the THK linear motion guides with caged balls. The design features 8-row raceway grooves, a smaller ball diameter and longer overall LM block length.

Pneumax Components for Vacuum Applications

Pneumax now offer a NEW and extensive range of vacuum cups in NBR, silicone and polyurethane, single/multi-stage vacuum generators, level compensators, vacuum valves and vacuum regulators.

Contact our sales office to discuss your requirements or visit our website.

New catalogue now available

ENGINEERING DESIGN SHOW

See us at stand E40
19-20 October 2016

40 YEARS

BUILDING TECHNOLOGY AND INNOVATION

Pneumax Ltd Tel: 023 8074 0412 Fax: 023 8073 9340 Email: sales@pneumax.co.uk www.pneumax.co.uk

Driving towards success

How the project manager and design team can get to where they want to be. By Graham Pitcher.

If you're not managing projects today, it may not be too long before the phone rings and the boss passes on the good news that you have been chosen to drive the company's next project. So what might you expect?

Simon Naylor, head of consumer and industrial project management with Cambridge Consultants, said a project manager's involvement can start at many points – from a blank sheet of paper to a mature design. "But what determines the success, or otherwise, of your project frequently isn't the technical side," he warned. "It often comes down to the project's stakeholders, its leadership team and your ability to control things."

One of the first things a project manager needs to understand is just who has an interest. "There are always stakeholders external to the project team," he said. "When I first discuss a project, I hope there are two or three key stakeholders and there is access to them. Fewer than this and the chances are there are stakeholders we don't know about. In this situation, the project is destined for an unpleasant realignment when missing stakeholders reveal themselves."

Too many, Naylor added, and you could be in for a difficult time. "You could end up with something 'designed by committee' because you can't make the necessary decisions."

You should also hope that stakeholders talk to each other and have complementary views and aims. And one should have the authority to make quick and lasting decisions.

Before the project kicks off, talk to the stakeholders, understand who they are and what's driving their involvement. "If there's uncertainty, that will be an area of risk and it's worth investing time to work out the relationships.

"As a project manager, you want to have control over what you're promising to deliver. The worst case is when there are fixed timescales, development effort and deliverables – for the typical project, that's a 'car crash' waiting to happen."

But a project manager doesn't have to be responsible for everything. "They will be responsible for the timescales," Naylor pointed out, "and the deliverables. But, ideally, they will have a 'partner in crime' – the technical authority or lead – who will be responsible for the technical stuff."

His analogy is a rally car. The project manager is the driver, with the technical authority navigating. "Between you, you work out the best way of getting to where you need to be."

Another area of risk is a fixed specification. "Specs are things that are hard to make 100% complete and are prone to interpretation

"You could end up with something 'designed by committee' because you can't make the necessary decisions."

Simon Naylor, Cambridge Consultants

differences. It's an important document and something you need the ability to work on.

"Think of it as a discussion document; one of its purposes is to extract information from stakeholders and to then get rid of possible misunderstandings."

If you're handed a complete spec, he added, it might be OK. "But make sure you have control over timescales and costs," he advised. "However, when things are written down and you weren't involved, that represents a danger area – you won't understand why they were written down. In reality, the world is grey scale, rather than black and white, so if you have worked on the spec, you will have a better understanding of what's really needed."

Any project leadership team worth its salt should identify the high risk areas. "Pick them out and prototype them," Naylor said, "or check them against the Laws of Physics to convince yourself the project can proceed."

There are three important elements to project definition – commercial, technical and management. "All three should be represented," Naylor asserted. "Commercial people want to sell something, technical people push functionality, while the project manager wants to deliver something. There will always be tension between them."

Simon's Tips

- **Focusing on immediate tasks means you neglect the future. Take time to look ahead**
- **When you're firefighting, it's easy to stop communicating. Communication is essential**
- **When you promise to deliver something, be clear about maturity levels. Does it have to be reviewed and updated? Does it need stakeholder approval? Be precise about your promises**
- **Be careful when under pressure; the temptation is to focus on things you're good at and assume everything else is OK**
- **Manage change. Beware of 'death by 1000 cuts' by accepting lots of little changes without agreeing trade offs, extra time or budget.**

Project management triangle

Naylor said there are three elements to project management and these can be considered as a triangle. "They are cost, deliverables and timescales," he explained. "You can't have all three; there has to be room for manoeuvre. Quality is a further issue, particularly if you're developing a medical device. Then, the area of the triangle will become larger. You have to be able to trade these elements off against each other; if they're fixed, then that's a big risk."

Project managers have to perform this trade-off constantly, Naylor continued. "If not, then it will be hard to deliver the project. But the priority at any point depends on what's driving the stakeholders. You might need to show something at an exhibition; that's a fixed date, so development effort or functionality will need to be flexible. Remember that things change and the project will need continual discussion."

Teamwork

One of the important factors which impinges on the success or otherwise of a project is the team. "The key thing is whether you assemble the team or inherit it," Naylor warned. "You're responsible for whether it functions and has the right skills."

Be mindful of the onset of Tuckman's stages of group development – forming, storming, norming and performing. "There's a natural process through which teams go. You shouldn't be alarmed by this and it can be useful. It's not about them or the project; it's group behaviour. But if you see issues, you have to step in and help to resolve them – ultimately, it could mean a change of personnel."

A good project manager will allow the team to be custodian of the project. "If you have to drive everyone all the time," Naylor said, "it's exhausting, so you need the team to take responsibility. But it will be your role to ensure progress."

Communication

"It's everything," Naylor highlighted. "Share things. If you see trouble brewing and don't mention it, that's crazy. If it becomes a problem, that will be a shock to the stakeholders. However, make sure you say what you're doing about potential problems."

Another useful communication technique is 'play back' – getting people to tell you in their own words what they think you asked for. "And write up what you do," Naylor continued. "Do it regularly and it's no big thing. If you're writing something, then share it. Make sure your project continues to go in the right direction."

Finally, be flexible. "Everything moves quickly," Naylor pointed out. "Although many don't like it, change is part of engineering. Without the ability to change, you'll design a product which the market doesn't need. But change doesn't come for free; something has to give and small changes build up. Document change," he concluded. "It doesn't take long to write down the nuggets."

ANSMANN's Li-Ion Range

Complete range of standard Lithium Ion batteries and chargers from stock

With more devices using Li-Ion battery technology, one of Germany's largest battery and charger manufacturers has introduced a range of standard battery packs and chargers.

> 'Turnkey' solution – battery and charger from one source

> ISO 9001 quality accredited factories in Germany and China

> Medically accredited EN ISO 13485 battery pack assembly line

> In-house design and modification to customer specification

> Transportation testing facility to UN 38.3

> UK Offices with professional quality, engineer and enquiries team

@: info@ansmann.co.uk
✆: +44 (0) 870 609 2233

www.ansmann.co.uk

Coatings

WS2 Stops galling of SS and Titanium

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

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

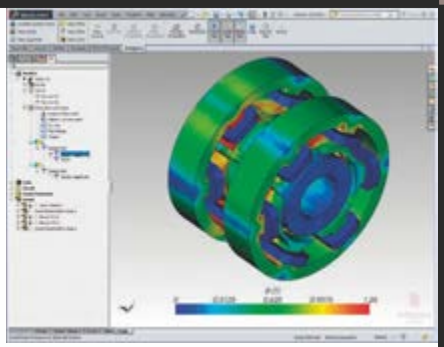
Design Out maintenance problems with WS2!

@: sales@ws2.co.uk
✆: 01430 861222

www.ws2.co.uk

3D Electromagnetic Field Solver

Infolytica - MagNet for SOLIDWORKS



MagNet for SOLIDWORKS is the foremost 3D electromagnetic field simulator embedded in the industry leading CAD software. A combination beyond compare: just one design environment for drawing the model and analyzing the performance of any EM device such as power transformers, sensors, MRI, actuators, solenoids and much more. This is not a live link or connection of two standalone software tools, but rather a fully integrated add-in to SOLIDWORKS which runs seamlessly inside the CAD environment.

Perform electromagnetic field simulations and quickly make geometric modifications to examine their impact on the design without worrying about exporting model data and dealing with compatibility issues. The property management pages and study setup use the same look and feel of SOLIDWORKS interface, making it intuitive to existing users.

MagNet for SOLIDWORKS' solution approach is based on the highly accurate finite element method for simulating static, frequency dependent or time varying electromagnetic fields. Read more about the complete feature set.

Useful features include:
Seamlessly add electromagnetic field simulations to the SOLIDWORKS CAD environment • Current flow in coils is automatically detected for easy setup • Detach and move components when post-processing results for easier understanding of the performance • Slice and peel through field results

@: enquiries@infolytica.co.uk
✆: +44 (0)1327 810383

www.infolytica.com/en/products/mfs/

Anti Vibration Products

FIBET GROUP

Manufacturer of High Quality Anti Vibration Products

From Conception through to Implementation

In addition to our extensive standard range of products, Fibet offer:-

- Bespoke Product Conceptualisation
- Design & Development using the latest CAE & FEA analysis techniques
- Inhouse Tooling Design & Manufacture
- Extensive Laboratory Facility with life cycle validation capabilities
- Optimised Manufacturing Facilities to suit your specific requirements

ISO9001:2008 ISO TS16949:2002

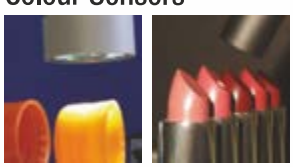
@: sales@fibet.co.uk
✆: 01282 878200

www.fibet.co.uk

SENSOR CENTRE
Sensors and more

Your Sensor & Barcode Specialist

Colour Sensors



Sensor Instruments

Position Sensors

Micro Detectors
Italian Sensors Technology

Bar Code Readers

DATALOGIC

Tel: 0844 3351232 Email: info@sensorcentre.com www.sensorcentre.com

More tea? I'll be back!

Once upon a time people used diaries – little books of paper with dates on – to ensure they knew what they were going to do at any given time. A couple of decades ago they were partially made redundant by the more comprehensive FiloFax and then completely trashed by the invention of PDAs (personal digital assistants), handheld computers and latterly by the smartphone. A similar technological path is true of the secretary, that multi-functional lynch pin of offices of old. Obviated by computer and, again, then by tablet and smartphone.

So what next? With so much technology at the engineer's fingertips – so many sensor technologies that can be used to interface with objects – what is the next generation of personal assistant going to look like? Should it be mobile or static, the size of a phone or a TV, how will it be powered…so many considerations. And what will it be used for – will it be an information source, a personal organiser, or (and a collective shudder went round the *Eureka* editorial team at the thought) a personal friend with a personality customised to the user.

The imagination can run wild here, but we are clearly looking to rummage around with some fancy electronics, sensing technologies and certainly a bit of Internet of Things thrown in.

We have, as always, a solution in mind which will be revealed next month. But if you have any ideas please send them to the editor at tim.fryer@markallengroup.com or visit the Coffee Time Challenge section of the website and leave your solution as a comment.

Last month's Coffee Time Challenge was to come up with a method of enabling clear hearing while protecting the ears from load noises, and the solution can be found on p10 of this issue.

jbj TECHNIQUES LIMITED

an excellence in engineering

www.jbj.co.uk/elika_gearpumps.html

Lower noise, higher efficiency!

ELIKA® is the solution for all applications requiring low levels of noise and high levels of efficiency, particularly at low speeds. ELIKA in fact reduces noise emissions by as much as 15 dBA compared to traditional external gear pumps. Maximum working pressures are similar to those for the GHP series (cast iron/aluminium), reaching 300 bar.

The helical profile of the gears reduces pressure oscillations and vibrations produced by the pump and transmitted to other components, reducing the noise of the hydraulic system. Axial forces induced by the helical teeth are optimally balanced in all operating conditions by the axial compensation system integrated in the pump cover. The low number of teeth reduces the fundamental frequencies of the pump noise, producing less sound.

ELIKA, with its characteristics, is the ideal solution regarding a wide range of specifications such as rotation speed, operating pressure and viscosity. The structure of the ELIKA pump minimises leaks and maximises volumetric efficiency in all conditions. ELIKA is therefore particularly suited for applications, which use inverters or variable-speed drives to regulate the speed of the actuators.

Available in groups 2, 3, 4 and multiple pump setups.

ELIKA 2: available displacement from 7 cc/rev. to 35 cc/rev.
ELIKA 3: available displacement from 20.4 cc/rev. to 87.1 cc/rev.
ELIKA 4: available displacement from 86.5 cc/rev. to 199.8 cc/rev.
ELIKA multiple pumps: Identical models from the group 2, group 3 and group 4 families can be combined in double or triple configurations.

Ideal for use in multiple applications due to its efficiency compared to standard gear pump types, it can improve the overall performances of the circuit in which it is mounted. Ideally suited to the industrial sector in general, presses, machine tools, test equipment, paper processing equipment, waste compactors and recirculation pumps. In the mobile sector, ELIKA pumps are well suited to material-handling applications, lifting platforms, street-cleaning machines and refuse collection vehicles. An excellent solution in marine sectors, as well as in new energy applications, where noise emissions and efficiencies are of prime importance. ELIKA is ideal for employment in systems with variable-speed drives where a variable flow pump can be substituted with a fixed flow ELIKA gear pump, combined with an inverter, lowering costs and the acoustic impact of the system, reducing vibrations and increasing operator comfort in fundamentally critical applications requiring elevated performance.

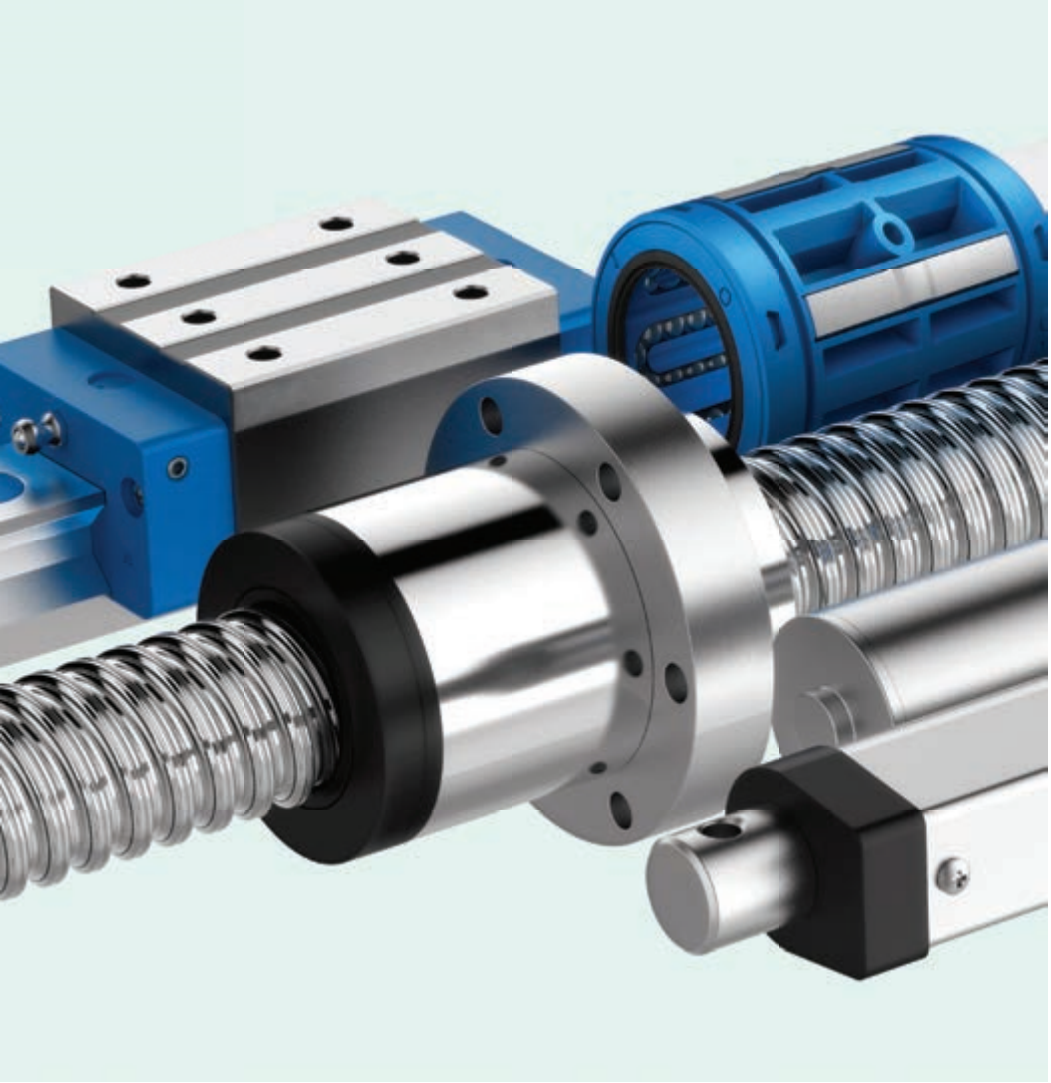
quality products for mechanical & fluid power

01737 767493 info@jbj.co.uk www.jbj.co.uk

jbj Techniques Limited is ISO certificated, committed to international coordination & unification of industrial standards.

- registered in England No: 1185469 -

A range of products ATEX certificated to directive 94/9/E requirements



Move in the right direction

Linear motion and actuation technology from SKF

Guiding: To provide optimal solutions for all your guiding needs, the SKF range of products feature linear ball bearings, profile rail guides and precision rail guides.

Driving: For applications that require driving by transforming rotary action into linear motion, SKF provides a comprehensive range of solutions including miniature ball screws, rolled and ground ball screws and roller screws.

Actuating: With extensive experience and knowledge of actuation systems SKF can satisfy the most demanding requirements utilising linear actuators, telescopic pillars and control units.

Request a catalogue today!

Call: 01582 490049 or visit:

skf.co.uk/lat

Follow us on:

ELECTRONICS DESIGN SHOW

ENGINEERING DESIGN SHOW

EMBEDDED DESIGN SHOW

INNOVATION | INSPIRATION | INTERACTION | INSIGHT

19 - 20 OCTOBER 2016 | RICOH ARENA | COVENTRY

Now in its fifth year, the Engineering Design Show is the UK's only event entirely dedicated to engineering, electronics and embedded design

HIGHLIGHTS 2016

EXHIBITION

Find solutions to your design challenges and discover the latest technologies or services from 200+ market leading suppliers.

CONFERENCE

Look out for world-class speakers and leading brands providing powerful content and insights into the future of engineering design including JCB, Elemental, Oxford Space Systems and BAE Systems.

WORKSHOPS

Learn new skills at high-quality workshops covering a wide range of subjects from software design, rapid prototyping, materials selection and test and measurement.

NEW FOR 2016

FUTURE ZONE

Take part in hands-on demonstrations of the latest Virtual Reality engineering design tools in the Future Zone with Virtalis and AMRC, showing you how to give your project a new dimension.

INNOVATION ZONE

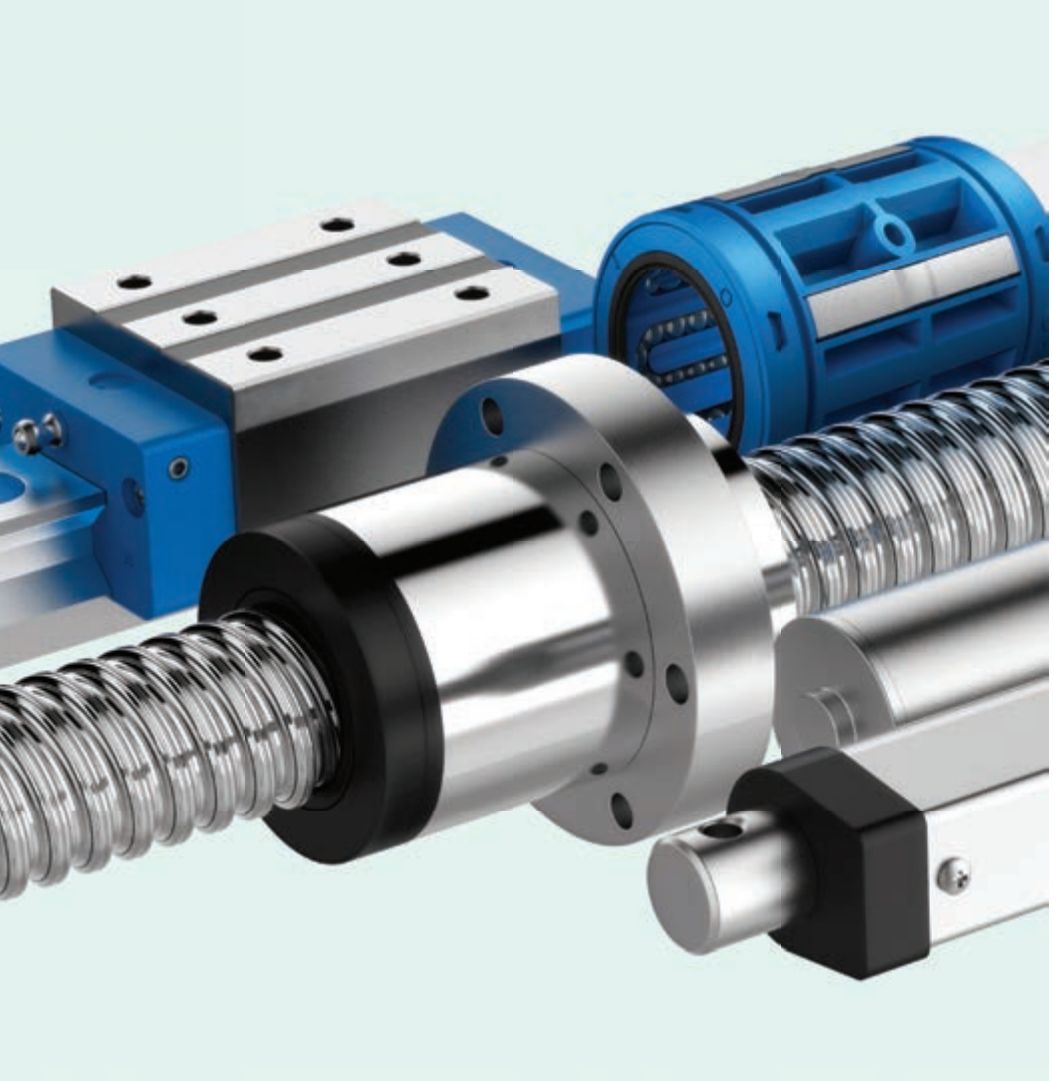
See world class design in the Innovation Zone. A motorbike fork end produced using an additive manufacturing process, the Rp1 track day car from Elemental and JCB's Hydradig are just some of the emerging technologies on show.

REGISTER NOW FOR YOUR FREE TICKET

WWW.ENGINEERINGDESIGNSHOW.CO.UK

HEADLINE SPONSORS

Altium | Digi-Key | IC BLUE | Mentor Graphics | pads | premier eda solutions | RS



Move in the right direction

Linear motion and actuation technology from SKF

Guiding: To provide optimal solutions for all your guiding needs, the SKF range of products feature linear ball bearings, profile rail guides and precision rail guides.

Driving: For applications that require driving by transforming rotary action into linear motion, SKF provides a comprehensive range of solutions including miniature ball screws, rolled and ground ball screws and roller screws.

Actuating: With extensive experience and knowledge of actuation systems SKF can satisfy the most demanding requirements utilising linear actuators, telescopic pillars and control units.

Request a catalogue today!

Call: 01582 490049 or visit:

skf.co.uk/lat

Follow us on: