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THE MAGAZINE FOR ENGINEERING DESIGN

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Engineering victory

Paying tribute to the
innovation behind D-Day



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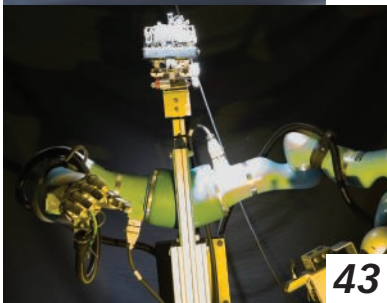
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A fitting tribute



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

As I write this, it is still a week before June 6th, which (as I'm sure you know) is the 70th anniversary of D-Day, when the Western Allies stormed the Normandy beaches and began the liberation of France and Western Europe.

It would be redundant (not to say inadequate) for me to detail the events of that momentous period in history. However, this month's cover story does offer some small tribute to one aspect of the enterprise: the engineering and design of the Mulberry B harbour, which became the vital artery of the invasion and transformed a small Normandy seaside town into the busiest port on earth in the space of a few days.

The genuinely remarkable story behind this is covered on pages 16-20 of this issue, but suffice to say that it is one that is fascinating, inspirational and – perhaps most importantly – places outstanding engineering design at the heart of the narrative.

This is because Mulberry B was an idea that was unique in history, but which nevertheless came to fruition and proved a genuinely transformative technology in the context of the Battle for Normandy. Plus, it has engendered technologies that are still used to this day.

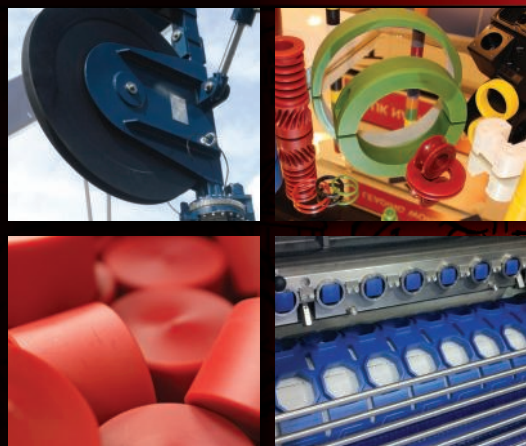
What this brought into sharp focus was the critical place that engineering design occupies in most – if not all – significant human endeavours. The fact is that, whenever any major undertaking is being planned, engineers are invariably at the very heart of the planning and execution.

Perhaps this does not seem a particularly blinding insight to you. After all, you as engineers know and understand just how crucial your skills are in ensuring the modern world works as it does. But ask yourself if the same is true of the general public. Do they ever give a second thought to the fact that engineering underpins almost every aspect of their daily life?

Of course, the commemorations of D-Day should be a solemn remembrance of the heroism, dedication and sacrifice of those who took part in them and an opportunity to remember the price that was paid for the freedoms we enjoy today. That is the focus of this anniversary and the role that engineers played in that – while worthy of celebration – is only one aspect of the story. Nonetheless, it remains one that has lessons for society as a whole.

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UK schools failing to nurture natural engineering talent



The education system is failing to nurture the natural engineering talent of UK students, a new report suggests.

The study, commissioned by the Royal Academy of Engineering, implies that primary school teachers do not actively encourage an engineering mindset amongst young people and that secondary school teaching of engineering is 'highly variable'.

"Young children are natural born engineers, constantly seeking to understand the properties of materials as they engage with the world around them," says the report. "However, the education system has come to expect young people to move away from practical learning as they grow up and to become more theoretical and abstract."

The review goes on to suggest that schools are actively promoting the message that people who design, make and fix things are less intelligent than those who can write essays, make speeches or understand quadratic equations.

While citing outstanding examples of innovative teaching practice at all levels, it says that "too many primary and secondary schools almost manage to extinguish the prototype engineering ability latent in young children".

The recommendation is that the engineering teaching and learning community considers redesigning the curriculum – starting from the premise that they are trying to cultivate learners who think like engineers.

Report author Professor Bill Lucas, from the University of Winchester, said: "Engineers think differently from the rest of the world. And society badly needs their problem solving, systems thinking and relentlessly-seeking-to-make-and-improve mindset."

"Yet the education system does little to teach in ways that will cultivate the engineers we will need. We leave it too late and, too often, teach it too dully. This has to change."

www.raeng.org.uk

Engineering still seen as male profession, says IMechE survey

Most of the public still consider engineering as a 'male profession', according to a survey by the Institution of Mechanical Engineers (IMechE).

The findings coincide with the appointment of the Institution's new president, Group Captain Mark Hunt (pictured), who has vowed to encourage greater diversity during his tenure.

According to the survey, 66% of the public associate the term 'engineer' more with men, with just 27% saying they associated the term equally with men and women.

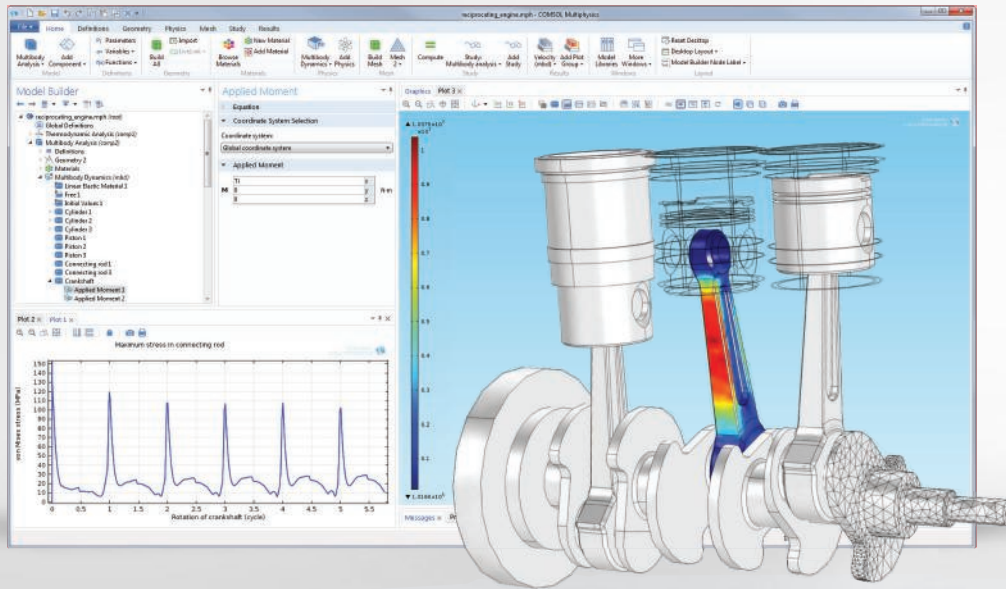
Two fifths (40%) of the public think the current image of engineering is deterring women from the profession, compared with 21% saying it is deterring both men and women.

Hunt said: "I want to use my year as president to demonstrate what engineers have to offer society, and to broaden public awareness of how engineers are improving the world we live in."

"I also want to help galvanise action to inspire the next generation of engineering innovators and work hard to encourage more diversity in the industry."



MULTIBODY DYNAMICS: Model of a three-cylinder reciprocating engine with both rigid and flexible parts is used for the design of structural components.



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Funding success for the Dearman liquid air engine



A consortium led by the Dearman Engine Company has been awarded close to £2 million in the latest round of IDP10 funding from the Technology Strategy Board to support the development of a heat-recovery system for urban commercial vehicles. This innovative technology offers potential fuel savings today of up to 25%, and life-cycle CO2 savings of up to 40%.

IDP10, the latest Integrated Delivery Programme competition run by the Technology Strategy Board, is a £10m funding scheme focused on providing support for low-carbon vehicle initiatives.

There is a pressing need for more cost-effective technology to improve the efficiency of urban medium and heavy-duty commercial vehicles and buses. Electric hybrid systems are seen by some as a solution, but costs remain high, leading to long payback periods (10-12 years for a bus). Full electric propulsion also remains expensive and remains limited by its range, and both options are well-to-wheel energy and carbon-intensive.

This project will deliver a production-feasible waste-heat recovery system for urban commercial vehicles, which offers life-cycle CO2 savings of up to 40%, fuel savings of 25% – with the potential of up to almost 50% – and potential payback in less than three years. The project uses the Dearman Engine, a highly-efficient liquid nitrogen or air (LiN) engine that harvests low-grade heat

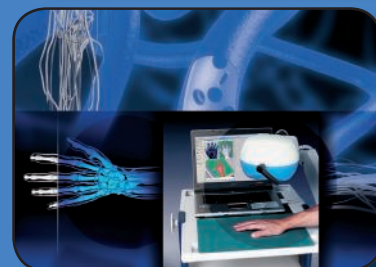
sources and, in this configuration, is most effective in urban duty cycles, working with the internal combustion engine (ICE) as a hybrid powertrain.

Using the Dearman Engine (developed by Peter Dearman, pictured) allows efficient use of the waste heat, leading not only to greater economy, but also offering the potential for improved air quality. The technology uses readily-available materials with low embedded carbon, and operates with commercially-available liquid nitrogen, which is readily available and is frequently produced using off-peak electricity, with great potential for storing wrong-time renewables.

The project will cost £3.25 million, £1.9 million of which has come from the Technology Strategy Board grant. Dearman is working with MIRA, Air Products, Productiv, The Manufacturing Technology Centre, CENEX and TRL, bringing together expertise in the Dearman system, industrial gases, ICEs, vehicle systems, legislation and standards and manufacturing. The consortium will deliver an on-vehicle demonstration of the hybrid system over the next two years.

Liquid air and the Dearman Engine were recently recognised as a potential road transport energy vector by the European Road Transport Advisory Council (ERTRAC). ERTRAC is the European technology platform for the road transport industry and is seeking to deliver the accelerated development of sustainable, integrated transport solutions. Called 'Energy Carriers for Powertrains', the ERTRAC report seeks to establish a road map for how industrialised countries can reduce the production of greenhouse gases in the road transport sector by up to 80% by 2050 when compared to 1990 levels.

This comprehensive report, which reviews all potential fuel choices, highlights liquid air as "an adaptable energy vector which can be created and consumed using traditional mechanical engineering technologies, stored safely in un-pressurised containers, and made from a free abundant raw material".



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BEEAs deadline looms – enter now!

The deadline for entry to the 2014 British Engineering Excellence Awards falls on 30th June, leaving only a few weeks left to go for glory.

Now in their sixth year, the Awards are designed to celebrate those UK companies and individuals that have demonstrated the skills, invention and dedication not only to compete, but to succeed on an international stage. The entries will be judged by an expert panel chaired by Andrew Burrows, Chief Technology Officer of i20 Water. The Awards will be presented at a lunch event, being held at 8 Northumberland Avenue, London on 9th October.

Categories for the Awards run the gamut of engineering design and include: Consultancy of the Year; Design Engineer of the Year; Design Team of the Year; Green Product of the Year; New Product of the Year (Electronic); New Product of the Year (Mechanical); Materials Application of the Year; Small Company of the Year; Start Up of the Year; and Young Design Engineer of the Year.

In addition, there will be awarded the British Engineering Excellence Grand Prix (which is selected from among the winning entries) and the discretionary Judges' Special Award.

If you think you have what it takes to win, enter now at www.beeas.co.uk

NT CAD/CAM supports National Women in Engineering Day

23 June 2014 is National Women in Engineering Day, a day dedicated to celebrating the work that women do in engineering and to showcase the great engineering careers available for girls.

To mark the occasion, NT CAD/CAM, one of the UK's leading SolidWorks resellers, is teaming up with Wiltshire College supported by the Engineering Innovation Network – South West (EIN-SW) to launch a Dragon's Den style competition exclusively for women.

The challenge goes out to all budding female design engineers to submit their most creative ideas to a prestigious panel of judges. The most viable entries will be shortlisted in early August and developed with the support of the new Wiltshire 3D Enterprise Centre, Wiltshire College's new CAD (computer-aided design) Centre and EIN-SW.

Haydn Earl (EIN-SW) Project Manager said: 'There are almost 20,000 female engineers in the UK, with almost 400 working in a design engineering role. We hope this competition will inspire even more women to make their bright ideas commercial realities.' We are looking for ideas which could be manufactured, are tangible and commercial. They do not need to be at the design or prototype stage and need only be submitted as a proposal.

To submit your entry please email EINSW@wiltshire.ac.uk

For further details, call Sheena Awdry 01249 466800 ex 6709.

Entries open 23 June and close July 31 2014. The winners will be showcased at an event in October.

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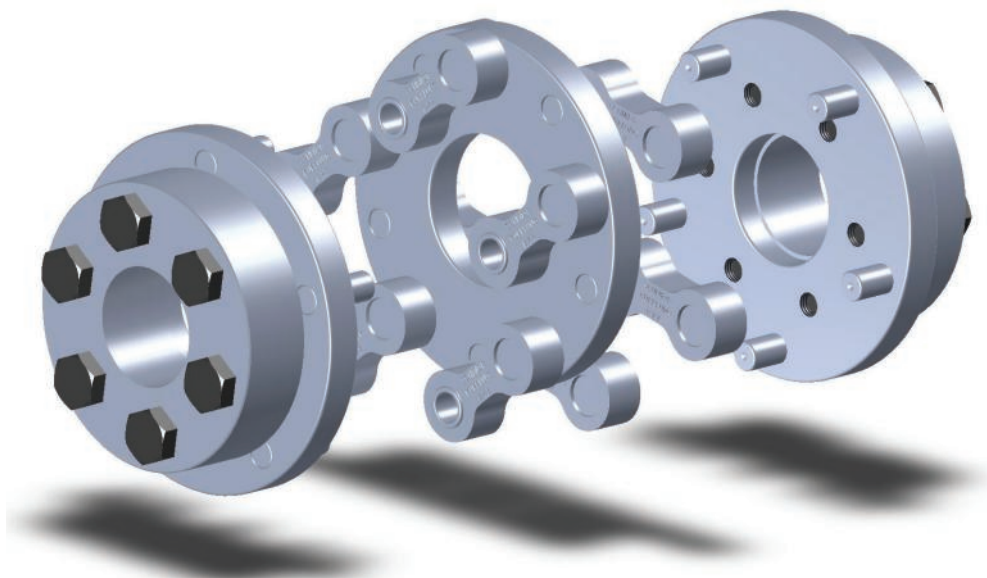
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Close together, far apart – The precision Schmidt-Kupplung

Delivering resistance-free parallel offsetting in a compact space, the Schmidt-Kupplung range may be just what you're looking for.

Wherever driven equipment is required to be axially displaced during operation, problems tend to arise. This is usually because the displacement can be disproportionate to the distance between shaft ends (DBSE). This can mean that, using conventional shaft couplings, it becomes impossible to transmit loads through a large parallel shaft offset without increasing the distance between shaft ends (DBSE).

This has the effect of increasing the machine's footprint, which is not an acceptable outcome in most instances. In addition, other coupling designs may suffer from a degradation of torque capacity and increased backlash during operation when required to accommodate such a high degree of parallel offset.

Fortunately, a viable alternative to this problem does exist in the form of the Schmidt-Kupplung range of shaft couplings offered by Abssac.

The Schmidt-Kupplung allows for exceptional radial movement while reliably transmitting backlash-free torque. This well-balanced system transmits torque without adding side loads to the drive.

Most importantly, the Schmidt-Kupplung delivers all these advantages in an extremely compact design. For example it is possible to have a parallel shaft offset of 275mm in an overall



length of 284mm.

A classic design for extreme parallel offset, the Schmidt-Kupplung is a compact, torsionally stiff performance shaft coupling that compensates for variable parallel shaft offset during operation. The Schmidt-Kupplung is the ideal precision component for shaft connection in confined spaces. Through its modular construction both torque transmission and radial offset capacity can be optimised for each application.

The well-balanced design means that the Schmidt-Kupplung is used in many applications, in fact the design can be used in any transmission design where high torque, high shaft offset and small DBSE is present. The

precision coupling transmits torque under constant velocity at all possible offsets and can transmit torque ranges from 35 Nm to 6610 Nm.

The couplings are able to transmit huge amounts of torque because the central disc is always defined.

Indeed, it is a mechanical guarantee that the centre disc finds its location and is always in the same place when the device is offset.

Typical applications for the Schmidt-Kupplung range include printing machines, roll forming machines, laminating machines and corrugated paper and papermaking machines. Of these, however, printing makes up the largest area of application. One reason for this is that shaft couplings for the printing industry are required to work with absolute precision to guarantee a register pressure and therefore ensure a high print quality.

The Schmidt-Kupplung is available in three basic series for various performance levels (Standard; Power Plus and Offset Plus). There are three different shaft-hub connections available: a taper lock, standard bore or flange mount.

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Press fitting iglidur plain bearings made easy

Polymer specialist igus has developed a simple to use press fitting tool for plain bearings. This updated and improved version of the original press fit tool PT-1350, which is designed to be used for bearings with an internal diameter of 13 to 50mm, is to now include the smaller PT-0620 which is suitable for fitting bearings with an internal diameter of 6 to 20 mm.

Both fitting tools ensure that bearings are pressed into the housing within the H7 tolerance. They are easily adjustable ensuring that the bearing is held in position during fitting.

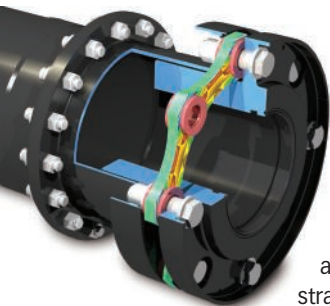
The self-centring positioning fingers ensure that the bearings



means the push-in aid will not break, even when fitting the bearing with an impact tool while reducing noise, thus meeting the needs of those customers who require quiet operation.

www.igus.co.uk

Disc coupling range to suit all applications



The Turboflex Composite Formed Tube (TFCFT) range of disc couplings from Bibby uses the latest material technology to provide high strength couplings with a low overall mass. The tubes are filament-wound on accurate mandrels using computer controlled machinery, and are cured while on the mandrel. This results in highly accurate tube dimensions, roundness and straightness; all of which contribute to a coupling claimed to be capable of excellent operational reliability even in hard wearing applications.

The high-quality materials and care that goes into the manufacturing means that Turboflex couplings are highly stable, lightweight units that, thanks to their low mass, suffer from minimal vibration even at lengths of 7m, where metal couplings would require support bearings. This makes them easier and quicker to install, and without the need for lubrication, they are essentially maintenance free.

The Form-Flex couplings, produced by TB Wood's, are able to transmit torque while compensating for angular, parallel and axial misalignment between two connected shafts.

www.altracouplings.com

Inclinometer provides flexible solution

The T-series industrial duty inclinometer from BEI Sensors is now available from Variohm EuroSensor. The sensor provides high resolution (0.01°) and high accuracy (0.1°) measurement of inclination (pitch and roll) or rotation movement with a dual axis range of +/-60° or an optional single axis measurement range of 360°. For maximum application flexibility, the unit can be supplied with optional 4-20mA or 0.5-4.5V analogue outputs with a CANopen version also available.



The fully-encapsulated sensor is supplied in a choice of glass fibre reinforced plastic or aluminium housing for maximum durability. Its IP68 rating can be extended to IP69K with an optional sealed five-pin M12A mating connector. A cabled version with connector is also available.

The compact inclinometer features advanced MEMS technology with integral linearity and temperature compensation for both offset and sensitivity to offer the best combination of precision, responsiveness and long life. The T-series is aimed at demanding harsh-environment safe level position monitoring and tilt measurement applications.

www.variohm.com

OMRON LAUNCHES TOUGH PHOTO SENSORS FOR WASHDOWN APPLICATIONS

Specifically developed to meet the needs of users in the food and beverage industries, photoelectric sensors in Omron's new E3FC range are detergent resistant and are ideally suited for use in operating environments where they will be subjected to regular wash down with high-pressure jets. In these tough operating conditions, E3FC sensors will provide a significantly increased lifetime compared

with standard sensors.

To allow easy installation and adjustment, Omron's new photosensors feature cylindrical threaded M18 bodies of the type often used for inductive sensors. The bodies are manufactured from corrosion-resistant 316L stainless steel, and are partly filled with epoxy resin to provide optimum protection against water jets and industrial detergents and to

prevent water entering via either the connector or cable-end.

All E3FC sensors have an IP68/IP69K ingress protection rating and an operating temperature range of -25°C to +55°C. Their durability has been verified by extensive testing with detergents and by thermal shock testing in surface-tensioned water.

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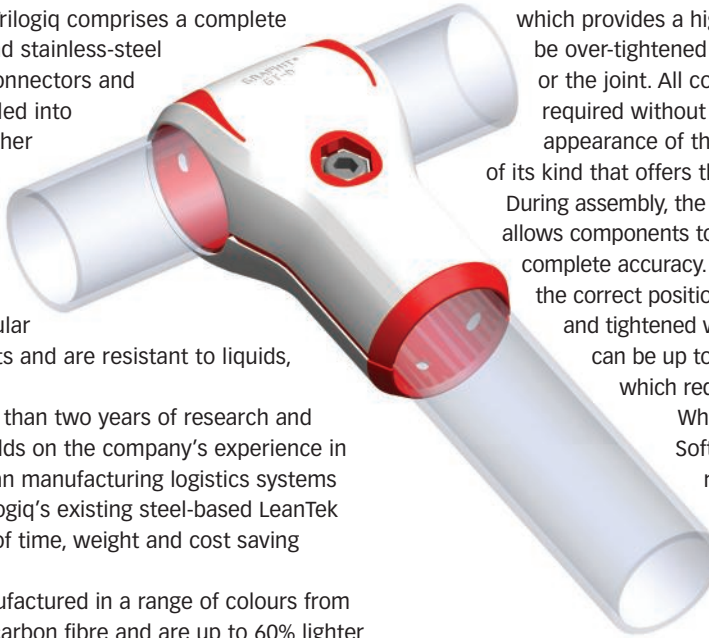
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Lighter, stronger modular handling

The new Graphit system from Trilogiq comprises a complete set of composite, aluminium and stainless-steel components including tubes, connectors and roller beds that can be assembled into adaptable trolleys, racks and other bespoke structures to stock, store and transport items in a wide range of industries and applications. The components are up to 86% lighter than conventional, steel-based modular systems, produce stronger joints and are resistant to liquids, contaminants and corrosion.

Graphit is the result of more than two years of research and development at Trilogiq and builds on the company's experience in devising ergonomic modular lean manufacturing logistics systems since 1992. It complements Trilogiq's existing steel-based LeanTek range while offering a number of time, weight and cost saving advantages.

Graphit connectors are manufactured in a range of colours from composite materials including carbon fibre and are up to 60% lighter than comparable steel components. The VeryGrip coupling mechanism



which provides a highly accurate and secure grip that cannot be over-tightened and does not damage or mark the tube or the joint. All components can be reused as often as required without affecting the structural integrity or appearance of the installation. Graphit is the only system of its kind that offers these benefits.

During assembly, the patented interlocking InstantMatch design allows components to be aligned quickly and easily with complete accuracy. A TPU insert holds the nut and screw in the correct position so that they can be brought together and tightened with one hand using simple tools. Assembly can be up to 30% faster than conventional systems which reduces downtime and improves productivity. When an installation is being reconfigured the SoftAdjust feature allows components to be repositioned quickly and accurately with complete ease. The simplicity and speed of adjustment is designed to encourage users to make the small modifications to introduce the incremental process improvements that

are at the heart of the lean manufacturing concept.

www.tubeandbracket.com

Solution to last month's Coffee Time Challenge

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The solution to last May's Coffee Time Challenge of how to improve on the humble doorstop comes from a UK company called Jamm, whose founders Marc and Coralie Ward designed it in 2011 after their three-year-old son, Oscar, jammed his fingers in a door at home.

Traditional doorstops did not give them peace of mind, so Marc set about improving the design that is found in most homes.

After a number of prototypes and a lot of head scratching, the Jamm Doorstop was born. It was so good, Marc decided to take it to market to protect as many little fingers as possible.

The patented design of the Jamm Doorstop holds doors tight from both sides at the same time, and works on all floor surfaces, as well as with all possible sizes of hinged doors.

The doorstops slide under the end of the door, and once in place with a grown-up push, their curved profile holds the door fast.

The design has won and been shortlisted for a number of awards, including the Pre-School Gold Awards for 2012 and 2013.

As well as being made from 85% recycled plastics, the packaging is as eco-friendly as possible, with no glue, staples or plastic. And the instructions for safe use are printed on the inside of the packaging, so it's designed to be kept, not dumped.

Jamm managing director and inventor Marc Ward said "Protecting little fingers is close to our hearts at Jamm, so we're extremely excited... We've had a fantastic response from everyone who's seen our doorstop."

www.jammproducts.com



Engineering **OVE**

The 70th anniversary of the D-Day Landings is a fitting time to pay tribute not just to the bravery and sacrifice of the troops involved, but also to the engineering that made success possible. Paul Fanning reports on a project designed to do just that.

This month, world leaders gathered in Northern France to commemorate the events that took place there seven decades before.

At dawn on June 6th 1944 (D-Day), Operation Overlord began with the intention of liberating France from occupation by Nazi Germany. That it was successful is well known, as is the fact that it required enormous courage, determination and some degree of luck in order to do so.

What is less well-known, perhaps, is that Overlord's success

depended on engineering of a scale and degree of ingenuity never seen before or since. However, an exhibit recently launched with the help of Dassault Systemes and its CATIA CAD programme is intended to change that by paying tribute to the engineers who helped liberate Europe from Nazism.

The effort takes the form of recreating some of the more innovative aspects of Overlord's engineering efforts. These included the flat-bottomed LCPV landing craft, the wooden Waco glider and the most ambitious of them all: the Mulberry B harbour.

The LCPV and the Waco may seem rather straightforward at first glance. But they are the work of talented engineers who with war raging — under tight constraints and with time and materials in short supply — successfully developed these inventions, which still stand as a source of inspiration for engineers today. Unfortunately, since they were constructed mainly of wood, these craft have all but disappeared, and divers find no traces of LCPVs today. An additional problem lay in how hard it was to read and understand the original plans, most of which were not been well preserved.



OVERLORD

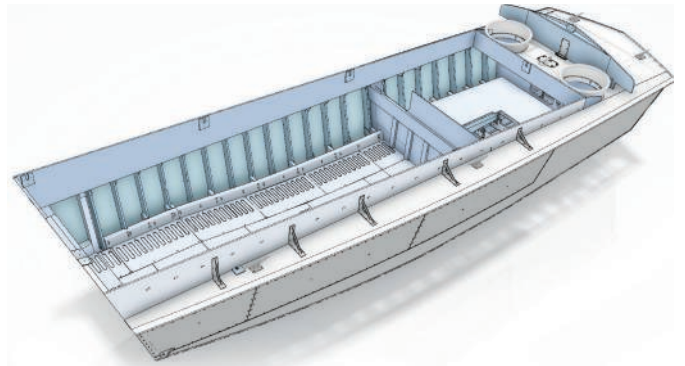
This ambitious reconstruction project involved identifying and locating all available sources of information about the three engineering achievements in question. Dassault Systèmes' teams embarked on a lengthy process of and painstaking research, taking them from Normandy to Louisiana, via London, Minnesota and Washington DC.

Behind the project was Dassault Systèmes' Passion for Innovation Institute, which is designed to put the company's technology and knowledge at the service of research, education, culture and artistic creation, helping innovators ask and answer questions about the past and future.

The Institute is dedicated to preserving our world's industrial heritage and in the past has helped solve the mystery of how pyramids were built, recreate the Giza Plateau in Egypt, bring 3D technology to the world of dance and create a historical reconstruction of Paris throughout the ages.

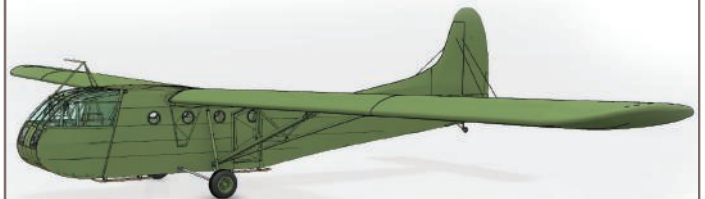
For the LCVF flat-bottomed craft, the plans conserved at the National World War II Museum in New Orleans and the Earl K. Long

Innovations of Overlord



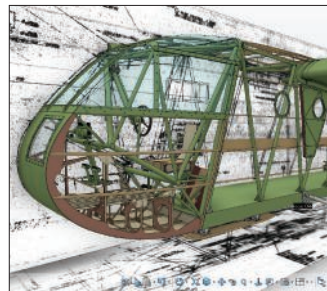
LCVP

The Landing Craft, Vehicle & Personnel (LCVP) designed by American engineer Andrew Higgins offered various innovative features. Each LCVP could carry a platoon-sized complement of men and weapons. Its flat-bottomed hull allowed it to run right up to the shoreline. The platoon leader would drop the full-width bow ramp and the men would charge down onto the beach. Thanks to its second rudder blade, placed forward of the prop, it would then reverse itself off the beach and head back out to the supply ship for another load.



Waco CG-4A Glider

The Waco CG-4A glider was the aerial counterpart of the LCVP. It could accommodate 13 troops and weapons, plus pilot and copilot. Relatively small, light and manoeuvrable, as well as silent, the Wacos carried troops deep into Normandy's 'bocage' landscape in the early hours of 6 June to secure the inland areas and seize key objectives, such as villages, bridges and crossroads.





Whale

The dock piers were codenamed 'Whale'. These piers were the floating roadways that connected the "Spud" pier heads to the land. The roadways were made from torsionally flexible bridging units that had a span of 80 ft, mounted on pontoon units of either steel or concrete called 'Beetles'. Their unique ability to twist up to 45° gave them great durability. After the war many of the "Whale" bridge spans from Arromanches were used to repair bombed bridges in France, Belgium and Holland. .

Library at the University of New Orleans provided a sound basis for the modelling process. This documentation was supplemented by photographs of the landings, particularly those taken by Robert Capa, and by an actual craft painstakingly restored by a team of enthusiasts in Carentan, Normandy.

For the Waco CG-4A glider, one of this type has been reconstructed in Granite Falls, Minnesota, also by a team of amateur enthusiasts, and the microfilms of the original plans were also available for consultation. Dassault's Passion for Innovation Institute produced a 3D laser scan of both the landing craft and the glider.

Isolated remnants of the Mulberry B harbour can still be seen at Arromanches. And the wrecks of the blockships, which formed part of the breakwater around the harbour, still lie on the seabed. But the most revealing clues about how this structure was built and operated came from the original plans, kept at the Royal Engineers' Museum in London, the construction and maintenance manuals, the aerial photographs taken at the time and the information provided by Tim Beckett, the son of Mulberry inventor Allan Beckett and himself an engineer.

All of this valuable data was brought together and scrutinised over a period of almost eight months by the lab teams. They were thus able to recreate the Arromanches artificial harbour, offering a fascinating and informative journey into this part of the engineering genius behind the Normandy landings. Using the CATIA software developed by Dassault Systèmes for design, engineering and improvement of

industrial products, they also modelled the Waco glider and LCPV landing craft, right down to the last nut and bolt, taking careful account of the materials used and how they would have behaved in real life.

For each of these three virtual simulations, the visual and emotional success of the interactive immersive experience was in no way achieved without compromising scientific and historical accuracy and entirely based on the available information. It is this dual objective that Dassault Systèmes believes makes the recreation such a valuable tool for historians, researchers, engineers and the public alike.

The Dassault Systèmes teams also identified, located and gathered all available data in order to create detailed 3D models of both the Waco glider and LCPV landing craft, right down to the last nut and bolt, taking careful account of the specific materials used and how they would have behaved in actual conditions.

The history of the Mulberry Harbour began with Winston Churchill, whose bitter experience of the Dardanelles campaign in the First World War had taught him the necessity of a port for the efficient supply and movement of men and materiel. The dangers of securing a defended port had been exemplified by the disastrous Dieppe Raid in 1942 and it was after this that Churchill wrote his 1942 memo demanding 'piers for use on beaches'. This was the memo that became Mulberry.

With a foothold secured on D-Day, the Allied invasion then required an extensive beachhead so that troops and vehicles could be offloaded. However, Normandy's key ports were firmly held and defended by the German Army. An artificial harbour was thus assembled off the coast at Arromanches — the first temporary



Spud Piers

The pier heads or landing wharves at which ships were unloaded. Each of these consisted of a pontoon with four legs that rested on the sea bed to anchor the pontoon, yet allowed it to float up and down freely with the tide.

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deepwater facility of its kind ever devised and attempted. Major Allan Beckett of the Royal Engineers developed a system of floating metal roadways mounted on pontoon units of concrete or steel, which connected the beaches to the floating pierheads, further out to sea where large vessels could berth.

Thanks to legs that rested on the seabed but allowed these floating platforms to move up and down with the tide, operations could continue round the clock, which was a world first. The system used to join the floating sections gave them great flexibility, absorbing movements caused by sea swell and the weight of vehicles moving over them.

Kite Anchors

The 'kite' anchors, which moored the floating platforms to the seabed, were designed to dig in further when the cable is pulled, thus keeping the structure firmly in place throughout the landing operations. Lastly, huge reinforced concrete caissons were laid in a semicircle around the artificial harbour to form a breakwater, protecting it from tide surges and storm damage.

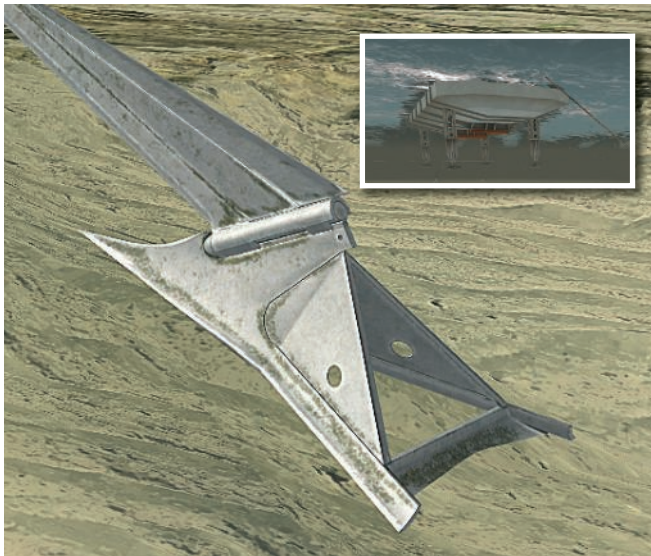
These technical innovations allowed the facility to be used at any time of day or night. By the end of July 1944, the Mulberry B at Arromanches was the world's busiest port in terms of traffic volumes. Some of the ideas first developed by Mafor Beckett are still used in marinas today.

Here again, the remnants of this impressive feat of engineering are slowly eroding away. Before all information is lost, the Passion for



Beetle

Beetles were pontoons that supported the "Whale" piers. They were moored in position using wires attached to "Kite" anchors which were also designed by Allan Beckett. These anchors had such high holding power that very few could be recovered at the end of the War.



The Kite Anchor

The 'kite' anchors, which moored the floating platforms to the seabed, were designed to dig in further when the cable is pulled, thus keeping the structure firmly in place throughout the landing operations.

The kite anchor design later became the popular plough anchor currently in use by sailors all over the world.

Innovation Institute and its labs have reconstructed these installations in an interactive and immersive virtual reality environment. The objective is not only historic, technical and educational, but also offers a sensory and emotional experience.

Tim Beckett makes it clear just how much this innovation means to him, saying: "I've been to Arromanches many times, but never like this. Following his father's footsteps, Beckett too became a consultant port engineer. He admits to using his father's example in his everyday work and makes it clear that these innovations have resonance everywhere today.

"I still use the inspiration of the Mulberry project," he says. "And I'm not the only one: you still see its influence in things like 'Roll-on, Roll-off' ferries; in the use of jack-up pontoons and floating caisson platforms. Obviously, it was a unique and uniquely important project that will probably never be repeated, but it still has echoes worldwide."

"Virtually reconstructing the Mulberry Harbour, the LCVP landing craft and the Waco glider brings to life one of the most exciting episodes of 20th-century history for the broadest possible audience, safeguarding this valuable part of our engineering heritage – a heritage that is gradually being lost," says Mehdi Tayoubi, Passion for Innovation Institute director & experiential strategy VP for Dassault Systèmes. "This project builds a bridge between the engineers of yesterday and today by preserving the memory of these remarkable technological innovations. The result is a fitting tribute to the engineers of then and now."

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Swiss **quality**

An emphasis on highly-specialised, high-quality product is the key to maxon motor's future, as Paul Fanning finds out when he talks to the company's CEO.

Maxon Motor is no ordinary industrial company. This much is obvious from its stunning location in Ewil, Switzerland on the shores of Lake Sarnen and surrounded by snowy-peaked mountains, which is almost a cliché of a Swiss pastoral scene.

However, the company's special nature is far from skin deep. As a manufacturer of highly-specialised motors, it occupies a position at the cutting edge of industrial innovation and far from the commodity supply of standard motors.

Eugen Elmiger, the company's chief executive officer, says of this position: "Maintaining our quality is at the heart of what we do because it is the key means we have of differentiating ourselves from our competition. Without that quality and the advantages it gives us, we couldn't compete in the markets we do."

And it is the markets in which maxon concentrates its efforts that give some clues as to the quality of its products. According to Elmiger, the areas where it is seeing most growth are all at the cutting edge. He says: "Medical has great potential for growth and so do aerospace, energy harvesting, biotech, green-tech. We're moving away from classic industrial automation because it's becoming increasingly commoditised – they increasingly don't need the sophistication in the motor as that sophistication is now in the controller."

According to Elmiger, much of the impetus behind the company's innovation comes from the customers. "80% of innovation is coming from the market, customers and applications and 20% from R&D," he says. "The customers are the most important guys for the company. We have to stay on top of the technology, but it's ultimately the customers who guide us there."

Besides quality, the key factors guiding product development according to Elmiger, are: "Cost, lead time, miniaturisation, increasing power and increasing the software intelligence into the products."

This latter, he believes, has posed significant problems, since it requires different ways of thinking and less traditional skill-sets than was once the case. He says: "30 years ago we just made motors and then we made gearheads and then we got into electronics and mechatronics. It's moving more and more away from mechanical and towards electronics, which is a difficult shift because it is easier to understand mechanical principles because you can see and hear and touch them. Software is more difficult."

Again, however, quality is the key to growing the business and keeping

customers happy. This, in turn, means a careful choice of suppliers. Says Elmiger: "Zero-failure strategy is the only way to succeed in our market. Particularly because of the applications we are in – aerospace; space; medical implants – we can't afford not to have the right suppliers because we can't be responsible for the failure of an aeroplane, a spacecraft or – worst of all – a vital medical system. So, when someone says we can save a few dollars by changing a supplier – however good that supplier may be – we cannot take the risk of changing and thereby risking failure."

This concentration on quality does pay off, however. Offering an example, Elmiger says: "Our quality gives us an ability to break into markets that we couldn't previously touch. The fact is that the requirements of the medical industry are such that they bring quality standards up to the levels of the aerospace industry. This means that

we're now able to supply to applications such as aerospace that would previously have been the preserve of specialist suppliers – often only with a slightly modified standard product rather than a piece of equipment developed from scratch."

However, the fact of keeping customers happy and the innate conservatism of some industries do pose their own problems in terms of innovation. "More conservative industries do represent a big hurdle for us," says Elmiger. "We want to constantly improve and change our products, but it's often our customers who say no because the products they've had have never failed, so they don't want to take the risk of changing. And yet every year they ask for a cost reduction or a weight reduction."

Other industries, however do offer opportunities to innovate. One of these, says Elmiger, is the oil and gas exploration markets, where rising fuel prices are making on-the-hoof innovation commercially viable. "80% of our markets are conservative and 20% highly innovative. Oil and gas, for instance, gives us an opportunity to deploy technologies we wouldn't dare put into a spacecraft," he says.

In terms of the future, Elmiger sees increased configurability as the key. Already maxon gives its customers the opportunity to configure and order their own DCX motors online for delivery in 11 days, which he believes will free up sales engineers to work on larger projects while giving the customer a fast and efficient service.

However, he believes this is just the beginning. "Things like the DCX platform will change our business, but it will take a few years. However, DCX is just an evolution. The revolution will come soon."

www.maxonmotor.com



CV

Eugen Elmiger has worked at maxon since 1991. He was a significant driving force in the establishment and expansion of the sales network in Asia at the end of the 1990s. He has been a member of the Executive Board since 2006 in charge of International Sales & Marketing and has been Speaker of the Board since January 2010. He qualified as an electrical engineer and studied further at the University of St. Gallen and Stanford Business School. He has more than 20 years' international sales experience.

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ANSYS and Spaceclaim: a greater whole?

The acquisition of direct modelling company Spaceclaim by ANSYS has raised a lot of questions. Here, Paul Fanning puts them to the purchasing company.

The biggest news of late in the design software sphere was when simulation giant ANSYS announced its acquisition of direct modelling leader SpaceClaim in a deal valued at \$85m.

What was perhaps most surprising about this deal was not that simulation and CAD should have moved closer together, but that it should have been a simulation company purchasing CAD capability rather than the other way around.

Spaceclaim, of course, has been a leader in direct modelling for many years. CAD users found value in being able to work with geometry without the constraints imposed by full parameterisation of their models. Direct modelling became so popular that a few years later, all of the major CAD packages now have some level of direct modelling solutions offered with their CAD applications.

The major CAD vendors have for many years had some level of simulation solution within their offerings, most of which were purchased rather than developed internally. At their best, these integrated simulation solutions work seamlessly with vendor's CAD data, allowing fast and accurate design iterations in the concept stage and then validation as the detail work progresses.

Clearly, this acquisition reverses this trend as a simulation vendor has bought a CAD company,

which points to the ever increasing importance that simulation is gaining in the product development process.

However, Todd McDevitt, marketing director for ANSYS, is keen to emphasise that this acquisition does not signal an attempt by the company to move into the CAD market, saying: "We're not trying to enter the CAD space. This is not our intent. That has been the knee-jerk response from some analysts, but it is not the case."

Instead, McDevitt claims, the major reason for the move was a previously-established compatibility and the potential that the acquisition offers for both parties. He says: "From the origination of Spaceclaim, we started working with Spaceclaim as a partner and then gradually we've OEM'd them into our platform. So for a

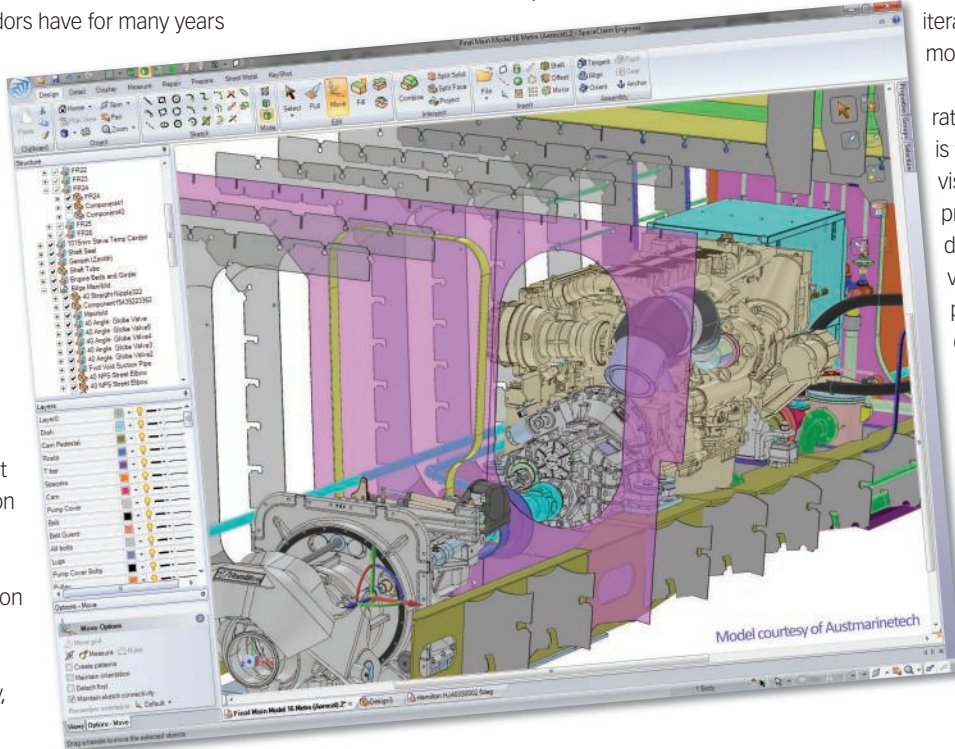
number of years we've been selling Spaceclaim through our Workbench platform. We were already contributing around 10% of their annual revenue. We have a long business relationship with them. We've seen our customers use Spaceclaim and become successful."

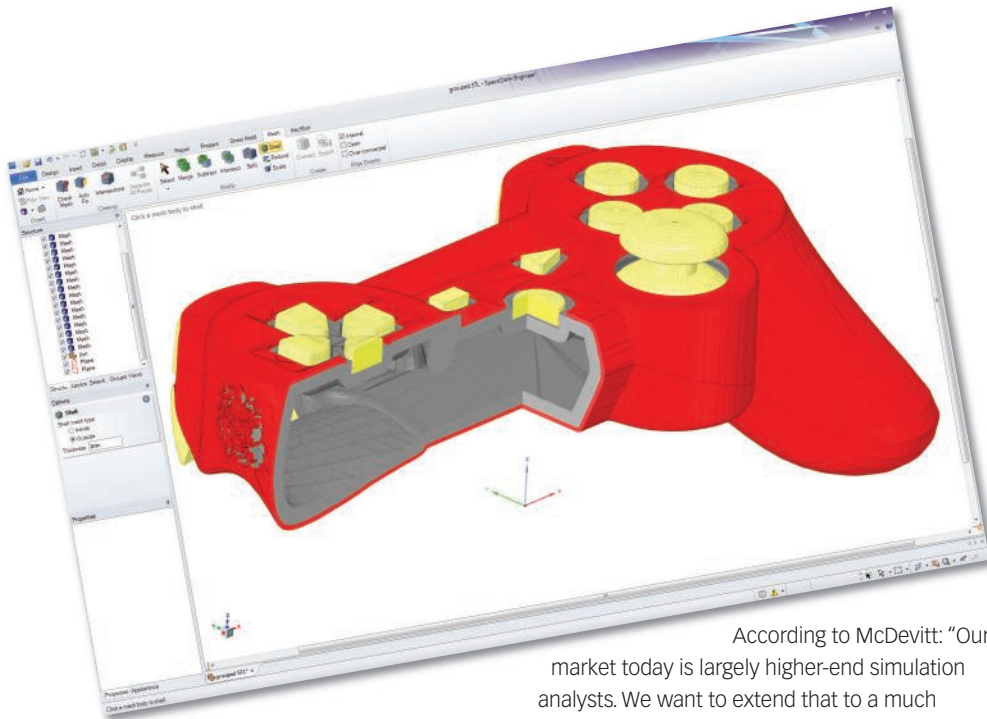
However, a more central plank of the idea is the ongoing move towards ANSYS' long-term vision of 'Simulation Driven Product Development', whereby (the company claims) organisations can derive tremendous value by harnessing computer simulation early in the design cycle to predict how a product will perform in the real world. With the addition of SpaceClaim, ANSYS will provide customers with a powerful and intuitive 3-D direct modelling solution to author new concepts and then use

the power of simulation to iterate on these designs to drive more rapid innovation.

Says McDevitt: "The rationale behind the acquisition is to help realise our overall vision for simulation-driven product development. The direct modelling approach is very receptive to engineers performing simulation and don't really have either the use for or the knowledge of how to use really powerful 3D parametric modelling solutions and gravitate more towards the Spaceclaim 'drag and pull', intuitive operation."

SpaceClaim, it is felt, can help simplify and automate what has traditionally been a time-





consuming process of preparing geometry for use in a simulation system, enhancing ease-of-use to help ANSYS accelerate product adoption and the growth of the simulation market overall. The transaction enables ANSYS to accomplish what would have taken the Company many years to develop alone, adding the talent pool, best-in-class design and expertise of a technology leader in 3D modelling software.

Bringing simulation software into play earlier in the design process is clearly of benefit to a company like ANSYS and it is anticipated that this will be a consequence of the move. "We're interested in pushing simulation further upstream into the design process," says McDevitt. "So, in other words, we want to get simulation more into the conceptual design realm before there is a detailed CAD model. Simulating earlier in the process to allow the simulation to inform the CAD model rather than waiting until a CAD model is nearly complete to do it."

The desire to grow its market is clearly another major incentive for ANSYS.

According to McDevitt: "Our

market today is largely higher-end simulation analysts. We want to extend that to a much broader engineering community that we know can benefit from simulation. Spaceclaim definitely helps us do that. If you look at all the engineers in manufacturing roles, we estimate that to be somewhere in the region of 25 million engineers. We think that Spaceclaim can help us get to five million of them that can benefit from what we do beyond our traditional analyst base."

Equally, he claims: "Simulation skills are growing among engineers and simulation is becoming much more common in engineering courses and so on. So the market for

simulation is much broader than just the traditional group."

SpaceClaim, of course, has been the leader in direct modelling for many years, as CAD users found value in being able to work with geometry without the constraints imposed by full parametric CAD software packages. Direct modelling became so popular that all of the major CAD packages now have some level of direct modelling solutions offered with their CAD applications, leaving some wondering where that left Spaceclaim. This acquisition would appear to provide the answer.

McDevitt believes that Spaceclaim's strengths make it ideally suited to ANSYS's existing customers, saying: "High-end CAD packages are not terribly intuitive or easy to use. Or rather they're not easy just to go into, use and then come out of. This technology is suited for conceptual modelling – pulling and dragging geometry about. It's also very neutral and flexible, affording all sorts of design formats.

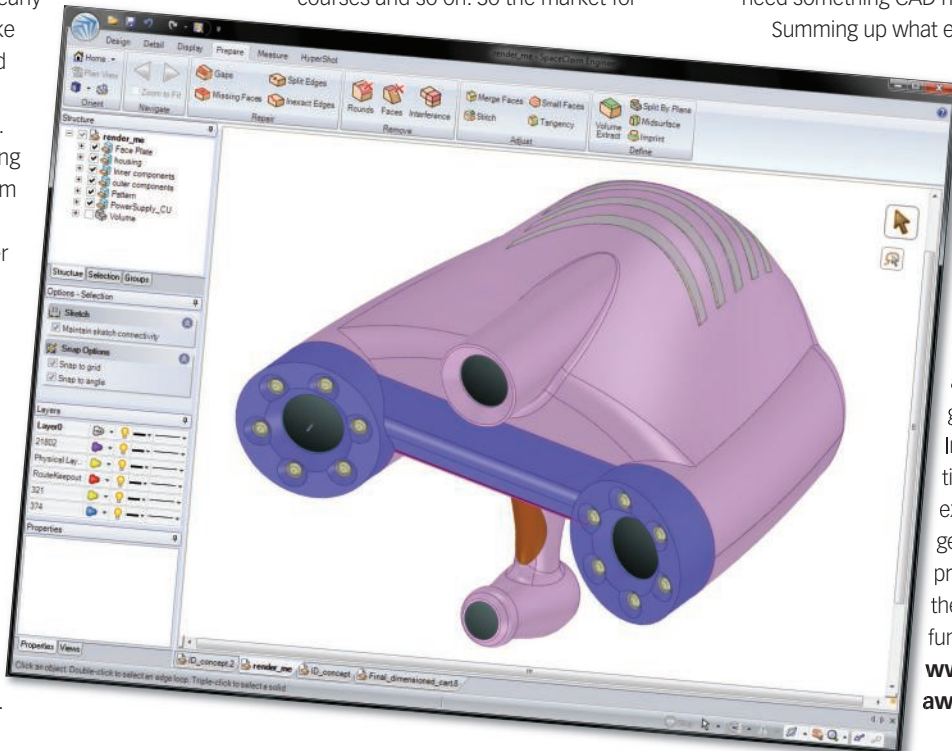
Another point of symmetry lies in the fact that ANSYS has always been an open platform and SpaceClaim's offerings are also CAD-neutral, allowing users to modify geometries regardless of the system in which they were created. Says McDevitt: "The days of basing something on a single CAD environment are gone. With global supply chains using a multiplicity of tools, you need something CAD neutral."

Summing up what existing customers of both

companies are likely to see in the future, McDevitt says: "The Spaceclaim customers are going to see the benefit of having simulation tools they didn't previously have. The ANSYS customer is just going to have easier access to Spaceclaim geometry and functionality. In addition, we have even tighter integration plans we expect to execute to bring geometry, clean up and preparation even closer to the set-up and analysis functions."

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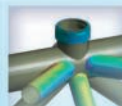
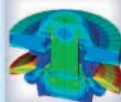
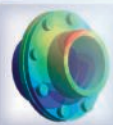
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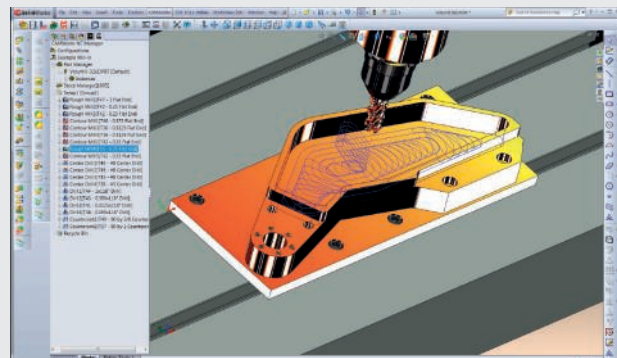
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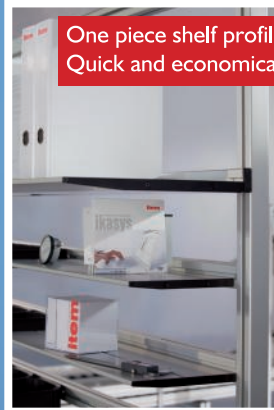
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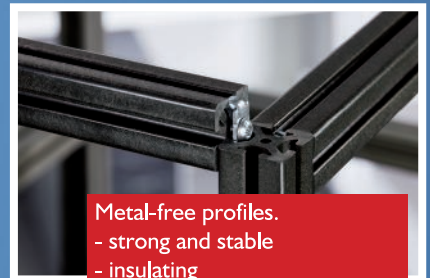
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Autodesk joins 3D printing revolution

Autodesk's announcement of its new 3D printing software platform and printer has shaken up the market. Paul Fanning reports.

It isn't often these days that the launch of a new 3D printer captures the imagination. However, when the originator of the machine is one of the world's leading engineering CAD companies, then everyone sits up and takes notice.

And so it was when Carl Bass, Autodesk's CEO recently revealed ahead of an appearance at the MakerCon conference in California that Autodesk is launching two new technology innovations that he believes will accelerate a new industrial revolution built around advanced manufacturing processes such as 3D printing. First is an open software platform for 3D printing called Spark, which will make it more reliable yet simpler to print 3D models, and easier to control how that model is actually printed.

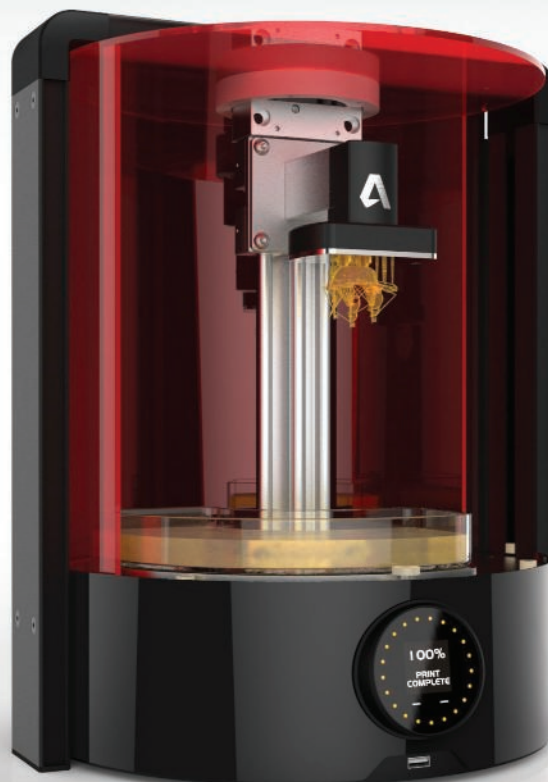
Second, Autodesk will introduce its own 3D printer that will serve as a reference implementation for Spark. It will demonstrate the power of the Spark platform and set a new benchmark for the 3D printing user experience. Together these will provide the building blocks that product designers, hardware manufacturers, software developers and materials scientists can use to continue to explore the limits of 3D printing technology.

Spark will be open and freely licensable to hardware manufacturers and others who are interested. The same applies to the 3D printer – the complete design of the which will be made publicly available to allow for further development and experimentation. The printer will be able to use a broad range of materials made by Autodesk and by others.

Carl Bass said of this latest development: "For years, I have

been fascinated by the promise and frustrated by the reality of 3D printing... The world is just beginning to realise the potential of additive manufacturing and with Spark, we hope to make it possible for many more people to incorporate 3D printing into their design and manufacturing process. Over the coming months we will be working with hardware manufacturers to integrate the Spark platform with current and future 3D printers."

It is not clear which open licence Autodesk plans to use to license its platform or the price at which it will offer the printer, but the company has said that the details would be provided closer to availability, which is expected in the



second half of this year.

Clearly, Autodesk feels that, by giving away both Spark and the printer's design, it will still profit by driving demand for the firm's other products, with which there will obviously be interoperability.

Speaking to the BBC, Bass said: "If 3D printing succeeds, we succeed, because the only way you can print is if you have a 3D model, and our customers are the largest makers of 3D models in the world."

Of course, the big question is what impact it will have on the market as a whole and the take-up of the technology. It is believed possible that, by sharing the design the market could see a second wave of small start-ups creating stereolithography machines just as the makers did when the early material extrusion patents expired.

The machine itself uses stereolithography rather than the extrusion technique favoured by most existing budget printers. According to Bass: "We're making a printer that, rather than just being able to load in proprietary materials, you can load in any material you want. You can formulate your own polymers and experiment with those. That's an important next step because we think material science is a breakthrough that has to happen to make [the industry] go from low-volume 3D-printed stuff to where it really starts changing manufacturing."

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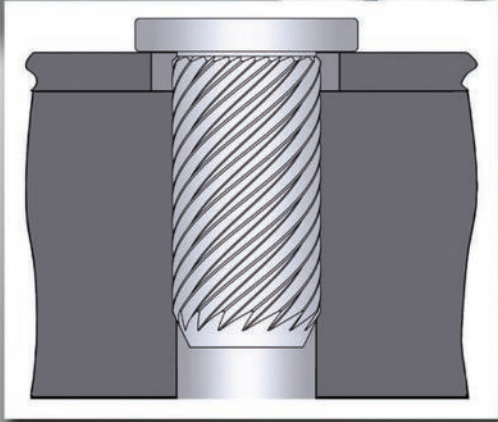
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Trends in the design of electronic goods are having an effect on the choice of fasteners. Paul Fanning looks at some of the products.

Fastening goes by the board

Where once it was believed that design would always be predicated on the need to take things apart and repair or recycle them, the fact is that the opposite has increasingly become true. Electronic devices, in particular, have seen a fundamental shift whereby disposability is increasingly considered the norm – even in expensive devices.

Due to their inherent cost, these devices have always been constructed in a way that they could be disassembled for repair should they go wrong. We are familiar with sending these devices to an authorised repairer who would disassemble and replace the faulty component, reassemble, test and return.

According to Dr David Quinn, European R&D director for PennEngineering: "Unbeknown to the consumer, there has been a growing trend over the years that many of the sub-assemblies are being manufactured with a higher propensity for disposal rather than repair. Additionally, the current quality of these components brings increased dependability, making failure during the product's useful life unlikely."

One key element in this change has been the elimination of the need for threaded screws to hold things together. Using traditional fasteners in modern plastic or non-ductile materials involves costs for inserts as well as screws. There are also risks of increased production costs through cross threading, over and under tightening, vibration loosening and others.

Some manufacturers have considered other approaches, including the use of adhesives or the use of rivets instead of screws. In the case of adhesives, they require time to cure, may be affected by temperature and are only useful when using similar types of material and low loads. In the case of rivets, they share some of the same quality issues as threaded fasteners in relationship to the security of the joint, but also suffer from a negative visual impact on the consumer.

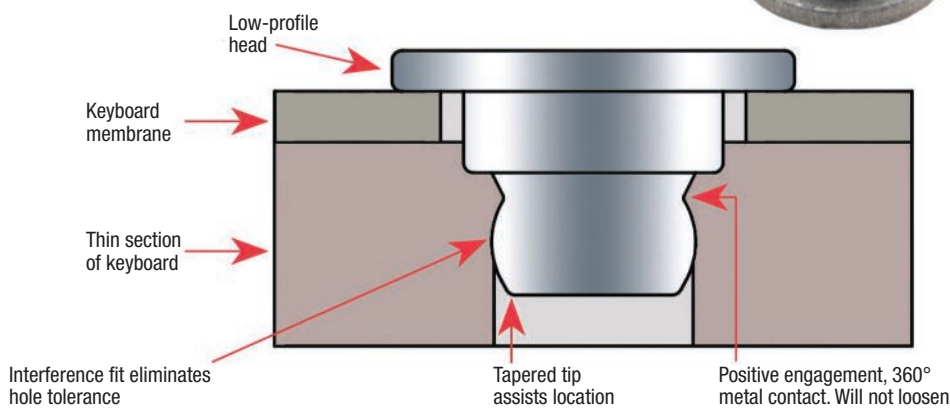
In more recent years, there has been a further shift towards making complete devices with no serviceable parts, in addition to the constant drive for smaller, lighter and thinner devices. Some examples of the technology that we are

seeing come to market are wireless broadband dongles, credit card reader attachments for smartphones or medical infusion devices.

What this has meant is a need for fasteners in the global electronics industries that reflect these trend. Says Dr Quinn: "It became apparent that there was a new need in the global electronics industry for a fastener that had the cost-effectiveness and simplicity of a rivet, yet displayed the precision, dependability and quality of a threaded fastener in a product that needed little real-estate or protruded substantially. Because of the nature of material used in electronics, this new type of fastener required the ability to bond different materials – metals, die-cast materials, and non-conductive plastics."

With these requirements in mind, PennEngineering devised a solution to the problem by developing two ranges of non-threaded fasteners to join the existing microPEM range: the TackPin and the Tacksert.

A Type T microPEM TackPin fastener is installed by first preparing properly sized mounting holes in the sheet to be attached and

TackPin® fasteners

the base panel. After inserting the fastener into these holes, the fastener is pressed into place. The fastener clinches into the base panel and the fastener's head subsequently holds the top sheet as thin as 0.2mm/0.008" firmly and permanently in place. The base panel can be as hard as HRB 45 or less on the Rockwell "B" scale and should be at least 0.89mm in thickness for blind holes or 0.5mm in thickness for thru holes. Upon installation, loosening due to vibration or other factors is not a concern.

During the process, the fastener's tapered tip assists in location, an interference fit eliminates hole-tolerance issues, and the self-clinching action results in full 360° metal contact. The fasteners can be installed automatically for high-volume applications.

In addition to the TackPin range, TackSert fasteners can be used to attach a top panel of any material as thin as 0.2mm / .008" to a base panel or chassis manufactured from common magnesium die-cast materials such as AZ91D or plastics such as ABS. They have a unique diagonal knurl which effectively holds the top panel to a base panel or chassis by broaching into the base panel/chassis using a simple press-in action, without the use of heat or ultrasonics.

TackSert pins are quick and easy to install using pre-prepared and properly sized mounting holes in the top sheet and base panel. Operatives or machines place the pin through the hole in the top sheet and into the mounting hole of the base panel; sufficient squeezing force is then applied using punch and anvil until the head of the pin contacts the top sheet. During the process, the fastener's tapered tip assists in location and a firm interference fit

eliminates hole-tolerance issues.

Designers can specify TackSert fasteners as either a Type TK4 Series stainless steel pin for broaching into castings and similar materials or a Type TKA aluminium pin for broaching into plastic applications.

Also designed for the electronics industry, TR Fastenings' plastic fasteners and fixings range for Printed Circuit Board (PCB) hardware and Cable Management requirements. Plastic fasteners and fixings are set to be a core part of TR's expansive product portfolio, with a comprehensive range available, on demand and competitively priced.

Manufactured in high-performance and incredibly versatile Nylon 6 and Nylon 6/6, TR Fastenings' new PCB range includes circuit board hardware, rivets, screws, Cable Management and Wiring Accessories. Combining functionality and reliability without compromising on quality, these plastic fasteners feature

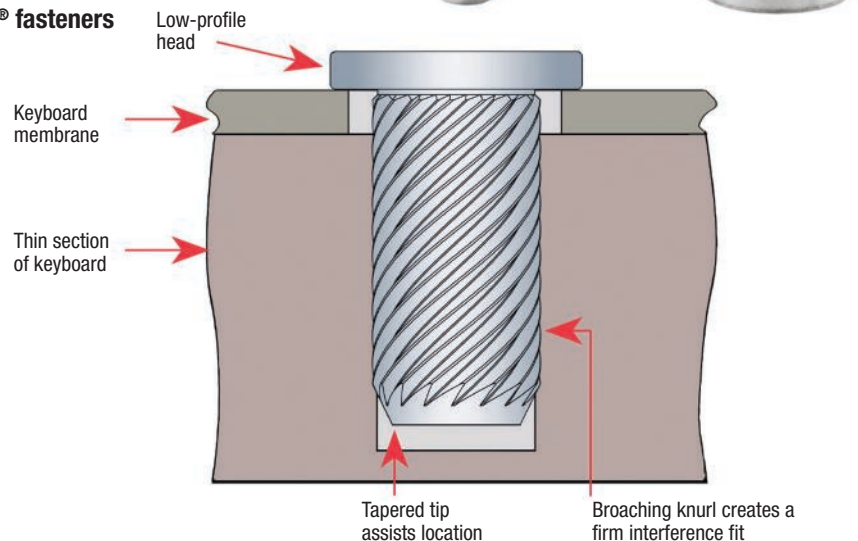
extensive benefits, which can assist in efficiency and productivity of production processes.

Not only can one plastic fastener be used for a variety of purposes, but they also have other qualities, including ease of use, being formed from a lightweight material, strength at low and high temperature, resistance to impact, abrasion, organic solvents and gasoline, retention of shape and stiffness at high temperature. Furthermore, TR's plastic range meets with the necessary industry standards and sizes, all products satisfy the RoHS compliance (Restriction of Hazardous Substances) legislation, are ISO 14001/2004 compliant and available in flame-retardant versions.

The new moulded Nylon range for PCBs addresses a multitude of application needs, but the range is especially beneficial in the electronics and telecoms industry, such as ATMs, PCs, laptops and mobile phones, as well as in lighting. In such applications, with their closely grouped electrical components, plastic fasteners offer the ideal solution as they are a non-conductive material. Furthermore, TR is introducing an extensive range of Cable Ties, Cable Management products and Wiring Accessories, for effective Cable Management.

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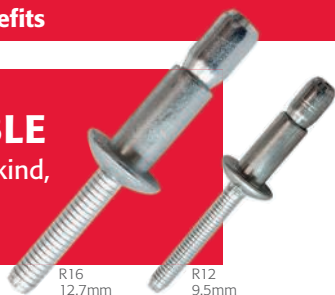
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IP65 compression lever latch

Elesa's new MDA.LS-SST is a rugged compression lever latch in stainless steel with a glass-reinforced polyamide hand knob. It is intended for frames and doors requiring gasket pull down for improved sealing, or for vibration resistance to ensure door security in high vibration applications.

The MDA.LS-SST provides 6mm of compression, enabling IP65 sealing with 90° latch movement and a further 90° to complete the compression. Its' companion MDA-L (not stainless) also provides a screw-down facility so that the door clamping pressure may be adjusted manually on each occasion.

www.elesa.co.uk

WDS launches latest range of CAM clamping levers

WDS, the UK's leading supplier of standard parts and machine accessories, has released a new range of CAM levers which allow for quick fastening and unfastening without the need for additional tools. The high-quality



CAM levers are available in a choice of stainless steel or glass-reinforced polystyrene (GRP) construction and a range of sizes to suit individual applications.

CAM levers are ideal for applications that require a high clamping force that can be quickly applied and released. The lever is initially tightened like a traditional screwed fastener, but the final clamping force is applied by a push-down lever which turns a CAM to apply the clamping force. The WDS range allows the application of clamping forces of between 2.5kN and 8kN without the use of any tools. Different sizes are available with reduced profiles for applications with less space, or longer handle options can be purchased to allow the clamping force to be applied with greater ease.

The entire range benefits from tough glass reinforced polystyrene (GRP) thrust washers to offer a secure and long lasting clamping force when the handle is pushed down and the CAM is activated. The levers are available with polished stainless steel handles and stainless steel pin, stud and washer; or black GRP handles with a choice between steel or stainless steel pin, stud and washer.

www.wds Ltd.co.uk

Screw thread calculator app

Hague Fasteners has announced a new utility for fastener professionals and design engineers with the release of the Hague Screw Thread Calculator App for iPhone.

Throw away those Thread Data Tables and Screw Thread books as Hague Fasteners bring you the perfect Engineers Thread Companion.

Now you can see all the data you need for Unified & Whitworth Imperial Screw Threads along with ISO Metric and Custom threads.

This handy calculator shows all the data you need for Standard UNC, UNF, UNEF, BSW, BSF, Metric Coarse & Metric Fine Threads.

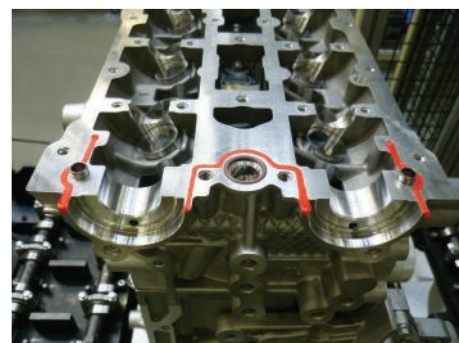
The Free App was officially unveiled at the 2014 European Offshore & Energy Exhibition at the NEC Birmingham, and is available in the iPhone App Store now, with exciting updates already being worked on for imminent release including the facility to create any non-standard custom thread size/thread pitch combination.

www.haguefasteners.co.uk



Blow-out resistant sealant

Working in conjunction with Ford Motor Company, Henkel – the world's largest adhesives manufacturer – has developed an anaerobic gasketing sealant for highly stressed engine joints. With exceptional flexibility, Loctite 5189 meets the



requirements of the on line blow-out test and thus eliminating the cost of extensive manual rework and offering robust sealing for high-volume engine manufacturing.

Loctite 5189 from Henkel offers substantial reductions in both reject rates and process costs in engine production. Aside from its short curing time, the gasketing sealant is also characterized by its good adhesion to metallic surfaces, particularly aluminum.

Rather than becoming glass-hard once cured, Loctite 5189 offers long term flexibility compared to previous gasketing sealants enabling it accommodate flange movement on highly stressed joints. Ford began using Loctite 5189 in production of its 1.0 litre and 1.6 litre EcoBoost engines in January 2014 and the product will be used globally by the end of 2014.

The two companies are linked by a business relationship that goes back more than 40 years. Henkel is Ford's preferred supplier of engineering adhesives and sealants for its globally-distributed engine manufacturing operations. This status has been achieved as a result of Henkel's focus on providing a customer service that enables companies like Ford to constantly push the boundaries of technology and gain competitive edge.

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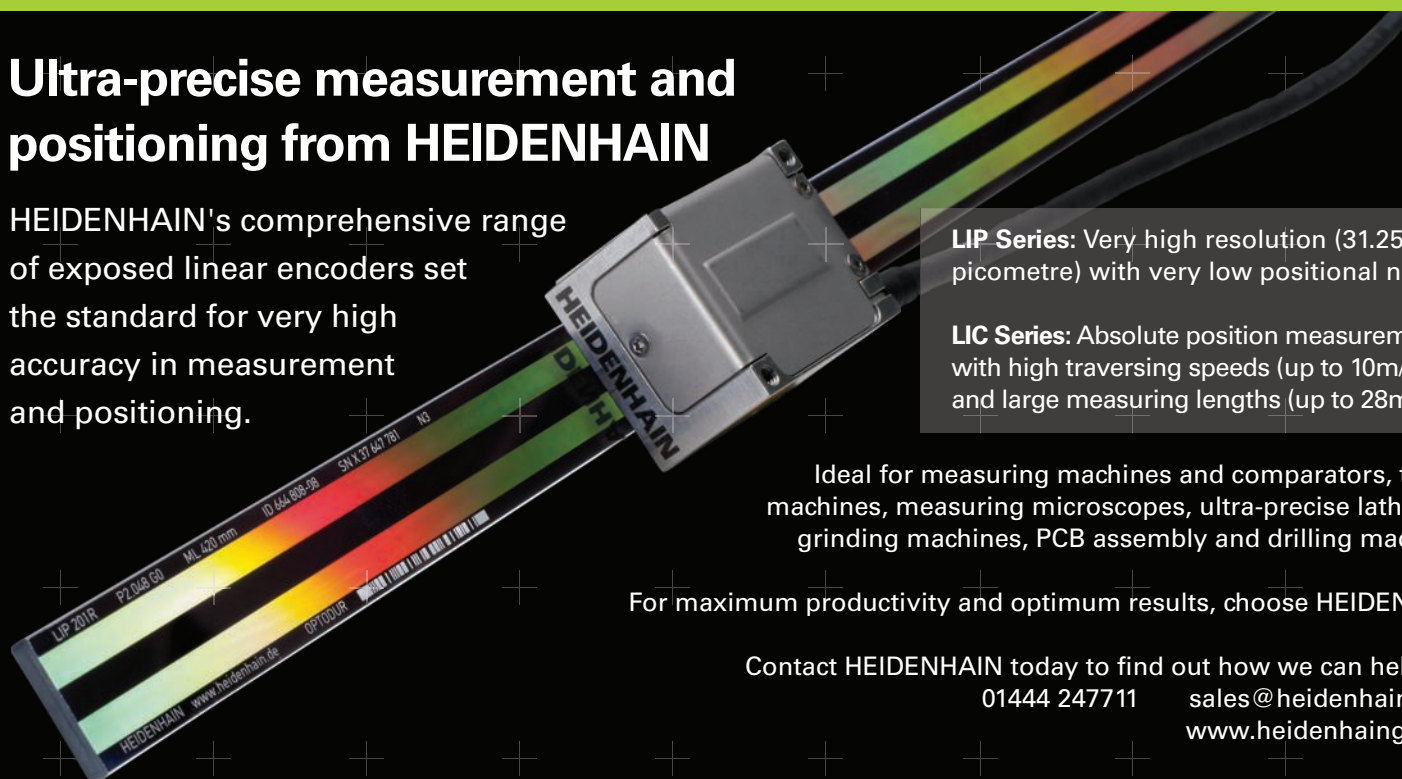


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3D scanning makes the leap

Like 3D printing, 3D scanning was once the sole preserve of the high-end user. Now, as Paul Fanning reports, hand-held, affordable scanners are appearing.

As the 3D printing revolution has gathered pace, so too has the requirement for 3D scanners. The ability to scan an object quickly and easily and then reproduce it on a 3D printer is not merely the preserve of novelty exhibits at trade fairs, but is increasingly a useful engineering function.

However, until now, both of these facilities have been the preserve of large, well-heeled organisations that can afford to shell out five figures on the equipment in question. However, 3D printers are now firmly within the price range of most companies and are finding a range of applications in the product development process.

And the same is true of handheld 3D scanners, a number of which are now available. Perhaps the most obvious link between the printing and scanning sides comes in the form of the Sense handheld scanner from leading 3D printing company 3DSystems.

Retailing at less than £350, the Sense is the first 3D scanner designed for the consumer and optimised for 3D printing. The Sense is the only 3D scanner to deliver precise instant physical photography, so everyone can capture his or her scanable moments. Sense has flexible scan size and can capture everything from a picture-perfect cupcake to a full-body 'selfie', processing

data in seconds for an instantly 3D printable file. Sense comes with an intuitive user interface with easy and automated zoom, track, focus, crop, enhance and share tools. Sense printables can be sent to Cube and CubeX 3D printers or directly uploaded to Cubify.com for cloud printing in a range of materials, including Ceramix, Aluminix and Clear.

The Sense offers mobile scanning compatible with the Microsoft Surface Pro 2 tablet and offers a highly diverse scan range, with auto-optimised settings for small and large objects like a book or a motorcycle, heads to full bodies and scenes as large as 10ft tall and wide.

Equally, the system's automatic object recognition extracts precise targets from the busiest of backgrounds, scanning only the object you want. Sense software is intuitive, fast, accurate and easy to use. Scans process in seconds and can be cropped, enhanced and solidified for printables in just minutes. Scans can also be uploaded directly for cloud printing with a variety of materials on Cubify.com or sent directly to a 3D printer.

Sense is powered by 3DS' proprietary Geomagic software, meaning that the Sense offers high quality, scan speed and easy editing capabilities for consumers. More recently, 3DS

has offered the iSense, which operates via the Apple iPad.

Creaform's Go!SCAN 3D scanner, used in conjunction with VXmodel and its 3D-scan-to-print functionalities, allows users can scan any 3D object, clean up their meshes, make them watertight, and quickly generate print-ready files. Thanks to VXmodel, they can bypass the unnecessary post-treatment steps as well as quickly and easily prepare their files to be printed in 3D.

Typically with this system, objects are scanned in five minutes or less, while it also provides all the functionalities needed to prepare scan models for 3D printing: alignment, geometrical entities and cross-sections, mesh improvement, mesh editing and more.

The Go!SCAN 3D provides an accuracy of up to 0.1 mm (0.004 in.) and resolution of up to 0.2 mm and users can easily and simultaneously capture high-quality geometry and colours.

"Creaform's unique Go!SCAN 3D and VXmodel module are the perfect complement for engineering and CAD professionals that use a 3D printer," said Francois Leclerc, Product Manager. "The duo's seamless and quick integration with any 3D printing or CAD process means that users no longer need to rely on third-



Creadorm's Hand Scanners offer a range of relatively low-cost 3D scanning options

party post-treatment software. This enables them to get the job done faster. With the Go!SCAN 3D and VXmodel, they ultimately get the optimal scan-to-print solution!"

Also from Creaform (albeit slightly further up the scale) are the HandySCAN 3D laser scanners, which have been completely re-engineered for optimum speed, accuracy and portability.

The new HandySCAN 300 and HandySCAN 700 provide high levels of accuracy, resolution and substantially higher measurement rates—all in truly portable device. The benefits of the metrology-grade HandySCAN 3Ds include a volumetric accuracy of 60µm/m, much greater speed (25 times faster than former generation); and automatic mesh output, allowing ready-to-use files as soon as data acquisition is complete.

Meanwhile, Eykona, a UK company that developed its technology for 3D wound imaging, recently transformed into Fuel 3D Technologies, which in 2013, raised over \$325,000 for the development of an affordable, high-resolution,

handheld 3D scanner through its successful crowdfunding campaign on Kickstarter.

With its origins in Oxford University, Fuel 3D is claimed to be the world's first 3D scanner to combine pre-calibrated stereo cameras with photometric imaging to capture and process a 3D model in seconds. The expected retail price of a Fuel3D scanner is \$1,500.

"Our core technology was originally developed with medical imaging applications in mind, so we are delighted to have secured this contract in order to ensure that, under Fuel3D, the Eykona scanning technology continues to play a role in the healthcare sector," says Stuart Mead, CEO, Fuel 3D Technologies.

The system resolves a fully 3D surface consisting of a large number of physical and colour measurements. These can then be viewed from any direction, edited, and used as source material for 3D printing or for on-screen manipulation.

When a picture is taken on a conventional 3D mobile phone or digital camera, it uses a technique known as stereoscopic imaging. This uses two camera viewpoints, one for each eye, to display a 3D image on a stereoscopic screen that gives the impression of depth.

By contrast, the core technology behind Fuel3D fuses geometric and photometric stereo 3D recovery techniques and is finely tuned to capture high-resolution 3D colour images. This raw capability provides the opportunity for an object to be captured in true 3D geometry and

full colour for any other non-medical applications.

Once a shot has been taken on the Fuel3D scanner, the raw image data is converted into true 3D colour geometrical data by the company's own software, which is included with the scanner. To run the Fuel3D software, users simply need a reasonable specification computer (Mac, Windows 7 or higher, 2GB RAM, dual-core processor).

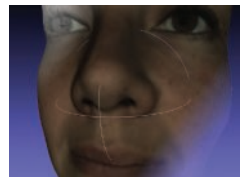
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The Fuel3D software incorporates proprietary algorithms to combine the data from its photometric and geometric 3D imaging systems to produce a single 3D model that is both accurate and has high resolution of surface detail. In essence, the high-accuracy, low-resolution geometric 3D data is used as a skeleton on which the higher resolution photometric 3D data is overlaid. The resulting 3D images consist of a large number (several hundred thousand) of samples, each having XYZ geometry (surface location in millimetres) and material properties (colour) in 8 bit RGB.

www.3dsystems.com

www.creaform.com

www.fuel3d.com

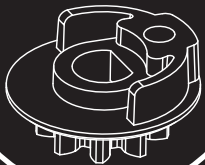


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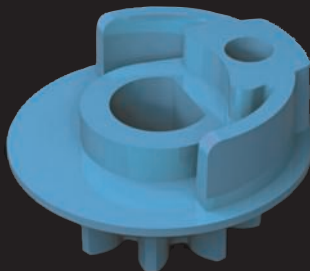


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Making the switch?

A game-changing sensing technology that could render the reed switch obsolete is a big claim. Paul Fanning finds out what's behind it.

The reed switch is a long-standing and reliable standby in the engineering world. Compact and lightweight, ambient-resistant and relatively stable in low and high temperatures, these hermetically-sealed switches find a multiplicity of applications across industry.

Given their ubiquity, then, when a company comes forward with the claim of having developed a technology that it believes will render reed switches obsolete, one is bound to sit up and take notice. That, however, is what Honeywell Sensing and Control is claiming for its new Nanopower Magnetoresistive Sensor Integrated Circuits.

Honeywell's Nanopower Anisotropic Magnetoresistive Sensor ICs that provide the highest level of magnetic sensitivity (as low as 7 Gauss typical) while requiring nanopower (360 nA). When compared to other, widely-used magnetic technologies, these sensors offer design engineers a number of advantages.

Based on a combination of AMR and BiCMOS technology, these sensors are smaller and more durable and reliable than reed switches, at the same sensitivity and essentially the same cost, the new Nanopower Series Magnetoresistive Sensor ICs are ideal for battery-powered applications where previously only reed switches could be used due to very low power requirements and large air gap needs.

The drivers for their development came from a number of factors affecting the sensor industry. These included a desire for miniaturised sensors for battery-powered operation that were not over-reliant on the increasingly expensive rare metals needed for permanent magnets. Equally, there was a desire for low power consumption, smaller size and high Gauss Sensitivity. While Reed switches offered low power consumption

and high sensitivity, they are too big for many applications. Equally, Hall Effect sensors are insufficiently sensitive, while the power consumption of AMR sensors leaves something to be desired.

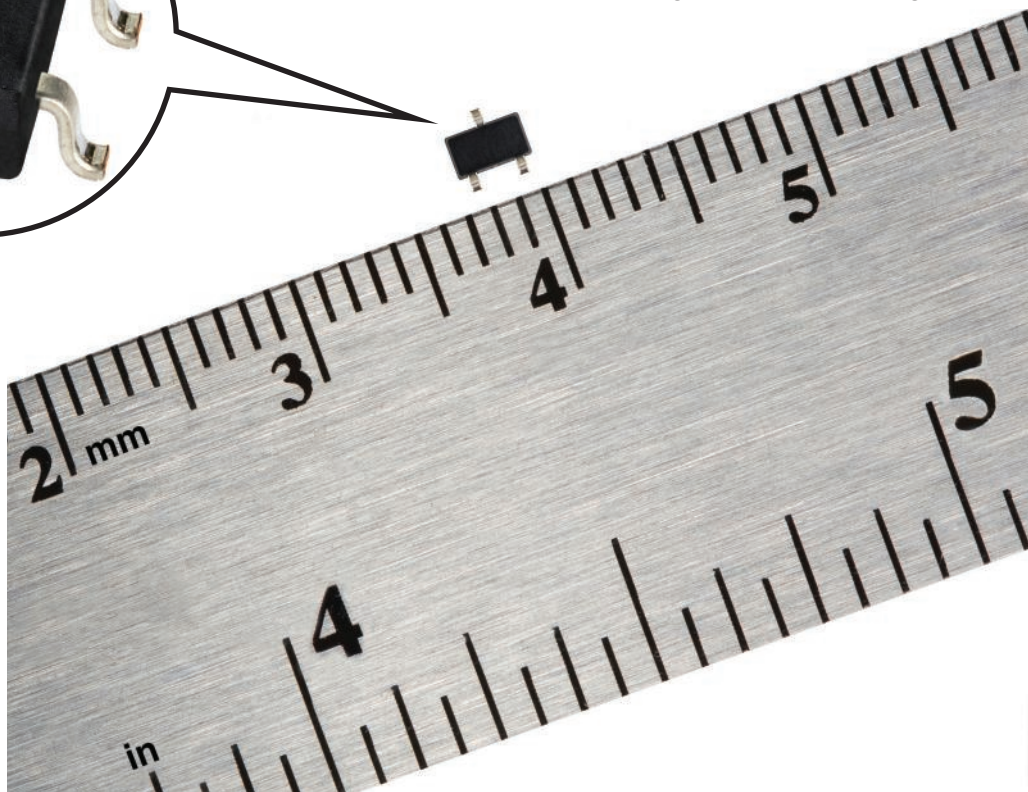
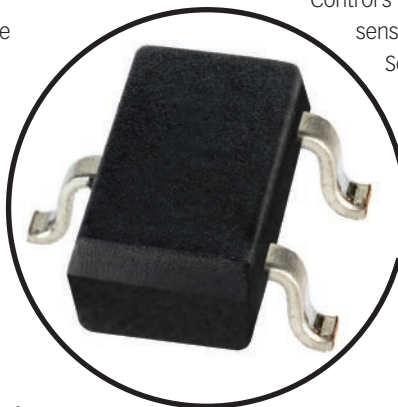
Compared with Hall-effect sensors, the new Nanopower Series Magnetoresistive Sensor ICs' higher sensitivity can offer the ability to sense air gaps over twice the distance of Hall-effect sensors. The higher sensitivity improves design flexibility and can offer significant application cost savings by using smaller or lower strength magnets.

James McKenna, Honeywell Sensing & Control's product director, electronic sensing, says of the Nanopower Series: "We feel that this technology has the potential to render reed switches obsolete in time. The

sensitivity of these sensors is ten times greater than AMR sensors, they require much smaller magnets, thus reducing cost, they are durable, solid-state sensors, which makes them much more durable compared to the glass tubes in which reed switches must be contained. Equally, unlike reed switches, they do not break or wear out over time."

However, it is not solely in comparison to reed switches that McKenna believes the Nanopower Series can succeed, but in opening up entirely new applications. "The main point to bring across," he says, "is that reed switches are now at the limit of what they can achieve, so nanopower allows designers to go that bit further. With these highly-sensitive, durable, small and reliable sensors we can now realise applications that were simply not possible before."

The Nanopower Series Magnetoresistive Sensor ICs are designed for use in a wide range



of battery-operated applications including water and gas meters, electricity meters, industrial smoke detectors, exercise equipment, security systems, handheld computers, scanners, as well as white goods such as dishwashers, microwaves, washing machines, refrigerators and coffee machines, and medical equipment such as hospital beds, medication dispensing cabinets, infusion pumps, and consumer electronics such as notebook computers, tablets, and cordless speakers.

In the industrial sphere, for instance, these sensors may be used to detect if the lid of battery-operated equipment is open or closed. Alternatively, they can be used as a counter in water and gas meters to determine water or gas use. At the moment, these applications require reed switches but, because of the low power requirements (500 nanoamps) of the Honeywell system can meet the need for lengthy battery life. In fact, these sensor ICs use a very low average current consumption and a push-pull output that

does not require a pull-up resistor. The sensor ICs can operate from a supply voltage as low as 1.65V.

In this context of water, electric and gas utility meters, the Nanopower series also offers particular benefits as it can be used to counter tampering. This is possible because they can be used to detect the presence of a magnetic field applied to the meter by a large external magnet in order to tamper with, slow down or even stop the meter's counting function.

"Due to the significant price increases for rare earth magnets, design engineers using Hall-effect sensors have been looking for ways to decrease the total cost of design by using less magnetic material, or moving to a more common magnet in their applications," says Josh Edberg, senior product marketing manager for Honeywell Sensing and Control. "Design engineers are also looking for an alternative to reed switches to reduce size and increase quality and durability, while maximising battery life. Honeywell's new

Nanopower Series Magnetoresistive Sensor ICs are ideal for these battery-powered applications due to their high sensitivity and nanopower."

The Nanopower Series is available in two magnetic sensitivities. The first is the ultra-high sensitivity SM351LT (7 Gauss typical operate; 11 Gauss maximum operate; very low current draw (360 nA typical). The other is the very high sensitivity SM353LT (14 Gauss typical operate; 20 Gauss maximum operate; very low current draw, 310 nA typical).

The push-pull (CMOS) output does not require external resistors, making it easier and more cost-effective to operate. The non-chopper stabilised design eliminates electrical noise generated by the sensor. The subminiature SOT-23 surface mount package, supplied on tape and reel (3000 units per reel), is smaller than most reed switches, allowing for use in automated pick-and-place component installation as well as greatly reduced production costs.

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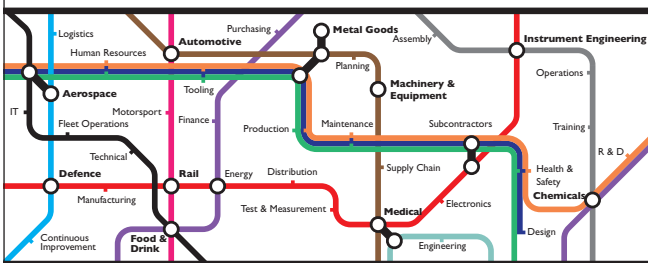
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Researchers at the University of Birmingham have designed a way of programming a robotic hand to be able to pick up an object and then use information learned in that first grip to grasp and move a whole range of similar objects

Robots get a real grip

Automated and robotic handling systems are often thought of as clumsy and only suited to certain applications. Here, Paul Fanning looks at some innovations that may change all that.

There are many different grippers in the automation technology sector and all of them essentially use the human hand as their working model. However, in most instances, each gripper is designed with a specific purpose. The problem with this, of course, is that if, for example, the shape of a product changes, the corresponding gripper must either be replaced on the machine or converted, which requires a great deal of effort. A gripper that is adjusted to different tasks would therefore be ideal.

For this reason, Festo's Bionic Learning Network developed the MultiChoiceGripper, which offers a combination of different grip types with flexible, adaptive gripping fingers. Its fingers can therefore be switched over so that they can either grip in a parallel or centric direction, without requiring any conversion.

This is enabled by two rotatable finger slots on the base body of the gripper, which are

arranged either around a central point or opposite the third finger. Naturally enough, this is inspired by the human hand with its opposable thumb, which can be rotated by 130° in relation to the other fingers. Depending on requirements, between two and six finger elements can be fitted to the MultiChoiceGripper. Besides the Fin Ray fingers, two other types of fingers can be attached.

Due to the adaptive fingers with a Fin Ray structure, the MultiChoiceGripper is not only variable in terms of the direction of grip as the fingers themselves can adapt to a wide variety of shapes. It can therefore grip differently shaped and also very sensitive objects without additional sensor or control technology. The adaptive Fin Ray-Fingers were designed in 2009 for the bionic FinGripper and have been continually developed ever since. For instance, since 2014 they have been made of food-compliant polyurethane, which means they can be used for the food

industry.

The MultiChoiceGripper can grip nearly every kind of object – apart from those that are very flat. In order to demonstrate this when exhibited, it first picks up the top part of a blue ball using the centric grip and puts it to one side. At the same time, there is a dark-blue cuboid in the ball and the gripper lifts this up and then places it next to the ball. At this point, a silver-plated cylinder appears; this is also gripped and put to one side. An illuminated blue diamond made of glass is the only thing left.

The gripper takes the diamond out of the small holder using its centric-gripping capability and holds it up for show. It then puts the diamond back, covers it with the cylinder and then places the cuboid over the cylinder. The ball is closed once again as the gripper replaces the top part of it.

Nature usually focuses on several operating principles with regard to its gripping systems. A

*The Festo
MultiChoiceGripper
can grip nearly
every kind of object
– apart from those
that are very flat*



combination of force fitting and form fitting is employed most often.

Force-fit gripping involves grasping and holding objects using forces acting on a particular point or area – such as frictional forces, vacuums, negative pressures, or magnetic and electrostatic forces. In the case of the form-fitting principle, the gripper adapts to the object and exerts less force.

When it comes to technology, most grip systems also apply both operating principles. The aim of these systems is to be able to handle objects with different shapes, sizes, surfaces and textures – preferably without converting the gripper.

A simple redirection is used as a kinematic technique for changing the direction of grip. A pull-push bar transfers the force to the holders located on the two finger elements, which in turn can be rotated. These holders change the finger position accordingly: either all the fingers are directed towards a central point, or alternatively two of the fingers are arranged next to each other, while the third finger takes on the function of the opposable thumb to enable a parallel grip.

By means of a mechanical locking system, which is pneumatically operated, the finger elements are fixed in their respective final positions.

Meanwhile, in the UK, A way of ‘teaching’ robots to pick up unfamiliar objects without dropping or breaking them has been developed by researchers at the University of Birmingham. The research paves the way for robots to be used in more flexible ways and in more complex environments. These could include manufacturing and packaging industries where a wide variety of different tasks have to be undertaken, and especially where humans and robots need to be able to work together.

It is already fairly commonplace to programme robots to pick up particular objects and move them around – factory production lines are a good example of this. But, as already explained, when those objects vary in size or shape, robots tend to get clumsy.

In the University’s School of Computer Science, researchers have produced a solution to this problem. They have designed a way of programming a robotic hand to be able to pick up an object and then use information learned in that first grip to grasp and move a whole range of similar objects.

The researchers taught the robot a specific grasp type, for example, a power grip, using the whole hand to curve around an object, or a pinch grip, which uses two or three fingers. The robot was then able to generalise the grip and adapt it to other objects.

Alta Innovations, the University of Birmingham’s technology commercialisation office, is currently looking for partners interested in licensing the technology. The University is already working with several companies keen to incorporate the technology into their processes.

“Current robot manipulation relies on the robot knowing the exact shape of the object,” explains Jeremy Wyatt, professor of robotics and artificial intelligence at the University of Birmingham. “If you put that robot into an unstructured environment, for example if it is trying to pick up an object amongst clutter, or an object for which it doesn’t already have an exact model, it will struggle.

“The programming we have developed allows the robot to assess the object and generate around 1,000 different grasp options in about five seconds. That means the robot is able to make choices in real time about the best grasp for the object it has been told to pick up and it doesn’t need to be continually retrained each time the object changes.”

The robotic hands used by the team look very similar to human hands, with five jointed fingers, however, the programming would also work with robots that had other types of hand, such as pincer grips.

Professor Wyatt’s research was presented at the International Conference of Robotics and Automation, organised by the Institute of Electronics and Electrical Engineers, in May 2014. It was carried out within the PaCMan (Probabilistic and Compositional Representations for Object Manipulation) Consortium, funded by the European Union. The consortium is led by Birmingham and also includes the Università di Pisa, in Italy, and Austria’s Universität Innsbruck.

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Keeping in touch

New control mechanisms are giving cutting edge prosthetic hands from a British company even more functionality. Paul Fanning reports.

Prosthetic limb maker Touch Bionics has launched a number of innovative new products that it believes will help people improve their daily lives.

Touch Bionics is a provider of world-leading prosthetic technologies designed to achieve positive outcomes for people with upper limb deficiencies.

The Scottish-based innovator was the first company to develop an electrically powered prosthetic hand with five independently-powered fingers and the company continues to be a pioneer in hi-tech upper limb prosthetic solutions.

Among the company's new range is a blue-tooth chip which activates the company's bionic hands and fingers into a specific grip. Called grip chips, these are bluetooth-enabled devices for users to assign a grip to an object and assist in performing the activities of day-to-day living.

Those chips can be placed by users in places around their homes or at work where different grips are needed for regular tasks which may include getting cutlery, lifting a kettle or using a computer.

While users will still be able to programme their prosthetics manually, the so-called grip

chips are said to offer a quick and easy alternative.

Bertolt Meyer, a wearer of the i-limb ultra revolution, said: "As a long-time prosthetic user, grip chips are a significant advance in prosthesis control and grip activation. "I am able to easily and precisely switch between desired grips based on what I wish to accomplish."

At the OTWorld 2014 International Congress in Leipzig recently, Touch Bionics also announced a new skin-like covering, called i-limb skin active TS, which lets people manipulate touchscreen devices. The Livingston, West Lothian, company suggested that this would be particularly useful for double amputees.

Upgrades and improvements to the range of apps that are used to control its products were also released, including compatibility with devices running the Android software operating system. Previously the apps, called 'my grips biosim' and 'my i-limb', were only available to those using Apple technology.

Touch Bionics claims that the new apps offer a potential to add 12 custom grips, which in turn means users can have up to 36 different options to position their prosthetic.

Ian Stevens, chief executive of the company, said: "Our grip chips, my grips and i-limb skin active TS are innovative new products that provide significant opportunities for i-limb wearers to precisely control and utilise their bionic hands.

Patients using these technologies can expect to achieve significant improvements in terms of self-esteem and the ability to perform activities of daily living."

A spin-out from the UK's National Health Service, Touch Bionics was founded by inventor David Gow and is funded and supported by Archangel Informal Investment and Scottish Enterprise. More than 4,000 Touch Bionics devices are in use around the world, with 95% of its sales made outside the UK.

The Scottish teenager Patrick Kane became the first person to be fitted with the i-limb ultra-revolution hand product in April last year. That came as revenue grew from a figure of £10.02 million to £12.3m.

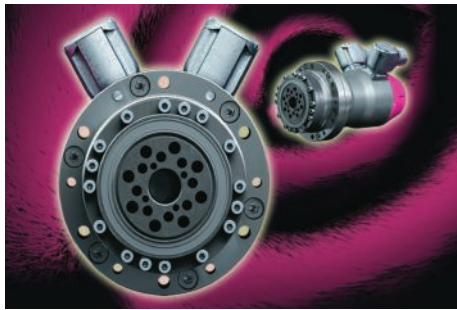
The company's products include electronic prosthetic hand and prosthetic finger solutions, as well as passive silicone prostheses that more closely match the natural appearance of the wearer.

www.touchbionics.com

Precision meets design in compact actuator

High precision drive technology expert Harmonic Drive has combined accuracy, compact design and reliability to create the LynxDrive range of compact servo actuators. As a result, the products are ideally suited for the broadcast industry, military and aerospace and oil and gas applications.

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The standard features of the new IDEC SmartAxis Touch provide the control & HMI needs for small machines, feed & dosing systems and many other applications.

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further space saving (cost saving No. 3).

The product offers many technical advantages due to the high specification and features. The screen size is 3.8" (100 x 300 pixels) and is a resistive touch format allowing freedom with your screen design and button locations. A choice of either colour or mono is available - the colour version has 65K colours and a super bright, high-resolution LCD TFT screen while the mono version provide an impressive 740 cd/m2 LCD STN display and backlit by either a white, red or pick LED light to draw the attention of the operator when alarms are present or actions are needed.

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IP Essentials for Start-Ups and SMEs

New and growing companies often have tight budgets and may think that it is not worth investing in protecting IP. However, inadequate protection of IP may lead to disputes and can ultimately prove more costly in the long term. Here, Jonathan Jackson, patent attorney and D Young & Co LLP partner, offers some advice.

There is little point funding the development and marketing of a new product or service knowing that a competitor can take the idea and launch their own competing product or service if all your hard work and investment creates a successful product or service.

Aside from stopping competitors launching a rival product or service, many companies are unaware that IP assets may even be worth more than physical assets. Businesses can generate income from the sale, licensing or commercialisation of products and services which are protected by IP rights. Indeed the value of some companies, such as ARM Holdings (whose chip designs are in every smartphone), is in their IP as they do not manufacture the chips themselves, but licence the IP in their chip designs to other companies.

What can you protect?

Most businesses generate and create innovative products which could be protected using IP.

This is a list of the variety of types of IP protection that are available:

- **Patents** – provides legal protection for new inventions – this could be an innovative solution to a technical problem and may be the way in which the product or service technically operates.
- **Trade Marks** – provides legal protection for your distinctive brand name or logo – this protects your business goodwill and distinguishes your goods and services from those of your competitors.
- **Designs** – provides legal protection for the “look and feel” of a product – this could be the visual appearance of products and their components, or even a typeface
- **Copyright** – provides legal protection against copiers of literary, artistic, or musical material.

How to go about it – your project IP checklist

Managing your IP is about managing risk and generating income. You should build IP action points into your business and project plans and be prepared to allocate budget for IP. It is better to be safe than sorry.

- Have an IP strategy.
- Allocate an IP budget.
- Instruct an IP specialist.
- Undertake patent, trade mark and design searches throughout project development to ensure you are not infringing someone else’s IP rights.
- Take special care if you are in a joint development so you know who owns what.
- Check contract terms (eg, confidentiality agreements) with third parties (joint development, contractors).
- Record development work and track who is an inventor.
- Look to secure your own IP rights. Consider patents and designs, trade marks and domain names.

Government schemes

A variety of government schemes are available to provide financial support for innovative firms:

The UK Patent Box – Under the Patent Box scheme a company can apply a lower rate of corporate tax payable from 23% to 10% on profits made by any company in the UK that can be attributed to qualifying patents.

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Research and development (R&D) relief –

This is a corporation tax relief that may be claimed for qualifying R&D costs. Two tiers of relief are available for SMEs, who receive 225% tax relief of allowable R&D costs, and large companies who are eligible for 130% relief.

The Smart scheme – The scheme offers funding to SMEs to engage in R&D projects at key stages of development. Offering a fast (30 day) decision turnaround, it is always open to applications.

The SBRI programme – The Small Business Research Initiative (SBRI) programme seeks to bring innovative solutions to specific public sector needs, by engaging a broad range of companies in competitions for ideas that result in development contracts.

Innovation vouchers – Innovation vouchers are provided to enable businesses to access specialist knowledge for all types of innovation. With a value of up to £5,000, the vouchers are available to start-up, micro or SMEs located in the UK for whom it is the first time working with the selected knowledge supplier.

Collaborative R&D – Collaborative R&D are competitions organised within specific technology themes, with the particular aim of supporting collaboration between businesses, and between businesses and academia.

Horizon 2020 – This is a European Union research and innovation programme offering nearly €80 billion of funding over the next seven years. Various funding opportunities are available including the SME instrument, which specifically seeks to support SMEs with international ambitions.

Conclusion

The range of schemes and types of IP protection available means that no start up or SME should be without it.

What's the catch?

Fish farming is one solution to overfishing of oceans, but it has its drawbacks. How can they be overcome?

Anyone with an interest in food will know that there are no longer plenty more fish in the sea. Over-fishing has depleted oceans that once teemed with life to the point that certain species of fish are endangered and once cheap and plentiful fish such as cod are now scarce and relatively expensive.

To give some idea of the scale of the problem, according to a 2008 UN report, the world's fishing fleets are losing US\$50 billion each year through depleted stocks and poor fisheries management. The report, produced jointly by the World Bank and the UN Food and Agriculture Organisation (FAO), asserts that half the world's fishing fleet could be scrapped with no change in catch.

Of course, one consequence of this has been that people have taken to eating species not previously considered to be a culinary dead end. However, this is not always satisfactory and people will still want to eat some species rather than others.

This problem has, of course, given rise to a burgeoning market for fish farming. By this method, it is possible to raise popularly-eaten species such as Sea Bass, Salmon and Trout in ponds, pools or pens without facing the vagaries of the sea, the depredations of predators (including other fishermen).

The problem is that these farms have a negative impact on their environment and, if poorly sited, can compromise water quality and compete for space with other marine concerns such as shipping, recreation, etc.

Equally, many feel that the fish raised in these pens are of inferior

taste and quality than their wild counterparts due to their diet and relative lack of exercise.

The Challenge

What is needed, then, is a means of farming fish while still giving them access to the open sea, with all the nutritional and environmental benefits that offers.

Of course, the obvious solution is simply to take a large floating cage out to sea – like a gigantic lobster pot. However, the difficulty would be in moving, maintaining and monitoring such a thing to ensure everything is working to plan and that the fish are healthy.

As ever, we have a solution in mind that is high-tech and has received a number of plaudits. It is automated, keeps labour costs low and improves safety, leading many to believe it could revolutionise fish farming.

The solution will, as ever, appear in the next issue. But none of that is to say that you can't do better.

We look forward to finding out.



The answer to last month's Coffee Time Challenge to redesign the humble doorstep can be found in our Technology Briefs section on page 15.

Precision Sensor Technologies



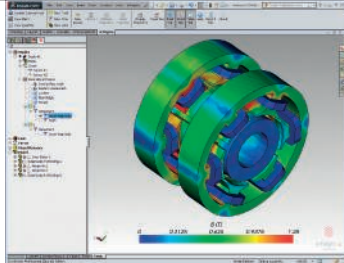
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Cameras

IVS launches new cameras to enhance inspection levels

New Industrial Vision Systems cameras offer one of the fastest vision systems in industry

Industrial Vision Systems Ltd (IVS) (www.industrialvision.co.uk) a supplier of machine vision solutions to industry, has

launched a new range of cameras which now offer one of the fastest vision systems available on the market. The NCG inspection cameras, which come complete with a fresh datasheet outlining their individual specifications, also feature higher resolutions and faster read rates resulting in greater levels of inspection monitoring.

The latest cameras offer a resolution of up to 2592 x 1944 pixels and at 105 frames per second they offer the ability to inspect up to 6,300 parts per minute on a single camera at much finer detail than previously available.



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