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“The vast majority of UK technology businesses are small operations. But being small doesn’t disqualify you from being creative or commercially astute.”

Graham Pitcher,

Group Editor,

Findlay Media

Engineering Design Division

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Small companies show the way

Precise focus and commercial skills mean success



“Both of these winning companies show that engineering skill and entrepreneurial management can drive success.”

As the British Engineering Excellence Awards conclude their third year, the judges continue to be impressed by the technical creativity and business awareness of UK companies.

Once again, the BEEAs have shown that UK companies are competing on a global stage and holding their own. For two of the first three years of the Awards, the Grand Prix has gone to a company with 10 or fewer employees and the Judges' Prize has gone to equally small companies over that period.

That's no real surprise as the vast majority of UK technology businesses are small operations. But being small doesn't disqualify you from being creative or commercially astute.

Let's highlight the stars of the show. Grand Prix winner ICS Electronics was established in 1982 and, within its niche market of marine radio communications, has grown to become a market leader, with more digital selective calling systems installed in Coast Stations worldwide than any other company.

ICS has kept a precise focus on three niche areas within the marine communications market to maintain a highly competitive position for a quarter of a century – a classic example of how to operate as a small company.

The judges described ICS Electronics as “a company whose size belies its influence” and were particularly impressed by its influence over industry best practice. One judge admitted that it would be easy to forget this is a small company, such is its influence and global reach.

Meanwhile, When Peratech entered the BEEAs in 2010, the judges had doubts about the commercial viability of its Quantum Tunnelling Composite technology. Those doubts have been answered emphatically with an entry that demonstrated impressive commercial success and which promises great things for the future.

Both of these winning companies show that engineering skill and entrepreneurial management can drive success.

I'm sure you'll join with me in congratulating all of today's winners and in thanking all companies who entered this year.

Tuning in to success

The winner of the British Engineering Excellence Grand Prix was selected by the Judges from the winners in the other categories; a challenging task, given the standard of entries to this year's Awards.

In awarding the Grand Prix, the Judges were looking for the 'best of the best'; a company which stands out from the other winners. The Judges decided that ICS Electronics met their criteria.

The marine radio market is competitive and features such well known companies as BAE Systems, Lockheed Martin and Northrup Grumman. Yet ICS Electronics – a company with only 10 full-time employees – has installed more Digital Selective Calling (DSC) systems – one of the most important parts of the Global Maritime Distress and Safety System – worldwide than any other company. Systems have been installed in 55 countries with more than 1000 operators. Bearing in mind the nature of the company's competition, that is an impressive achievement.

DSC systems became compulsory for commercial vessels in 1999 and feature in most marine radios. According to ICS, such systems consist of a 'big red button' which is pushed when there is an emergency. It believes its early entry to this market has secured its name and reputation since.

In 2010, ICS developed a replacement DCS system for UK Coastguard and in 2011, launched its Audio Switch range, based on the Voice over Internet Protocol (VoIP) standard. Describing the approach as 'Radio over IP', ICS says this system can't be created using off the shelf components. Problems included synchronising IP packets from multiple receive sources and using a voting system, with results presented to an operator in a clear and understandable format.

However, competing in this market is not without its challenges. While the market appears to be attractive, with contracts often in excess of £1million, projects often have long lead times and duration, while customers in some countries, including governments, can be unreliable. ICS says it has addressed these issues successfully by managing risk.

ICS has three main strands to its business: coast stations; commercial; and leisure. The coast station market provides 90% of the company's revenues and 85% of its turnover comes from exports. Nevertheless, it regards the commercial and leisure sectors as having great potential and will be introducing products for these markets in the near future.

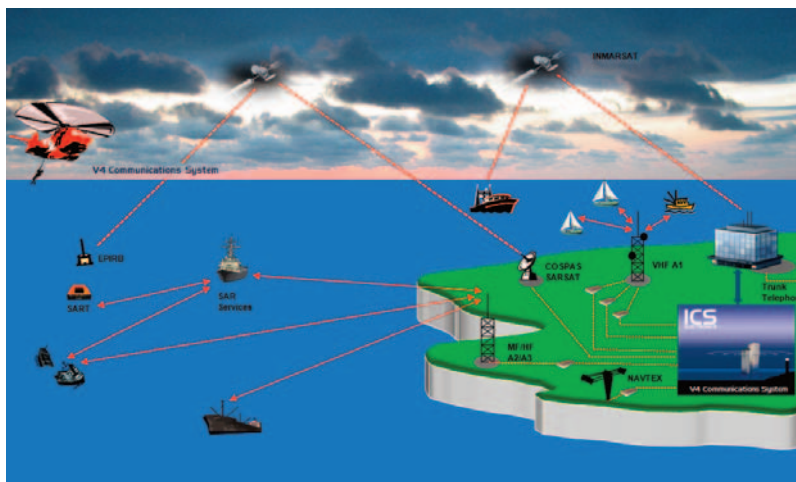
Apart from developing specialist hardware and software, ICS also helps set industry best practise by participating in international



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What the judges said:

“I couldn’t believe that such an influential company only has 10 employees – it’s deeply impressive.”

“I’m particularly impressed that a product with global reach is from a small UK company.”

“Influencing legislation is tough for a small company.”



committees, maritime organisations and technical forums. As a result, it is regularly consulted by international agencies for guidance on marine communications issues.

Asked why it succeeds, business development manager Peter Batt said: “We have a strong and long track record, good repeat business, market specific products, competitive prices, high quality products and high levels of customer satisfaction.”

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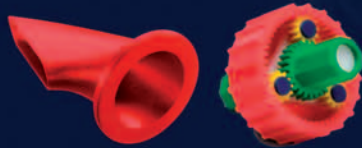


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Driving transmission excellence

How do you select a company as Consultancy of the Year? It's a question that exercised the Judges' minds this year.

Five companies made this year's shortlist, each of them a different size and operating in a different market. But there are measures that can be applied, including speed, flexibility and productivity. A good consultancy will be able to demonstrate all of these qualities.

Three of our finalists operate in different parts of the broad electronics market. A further company offers general engineering services, particularly to the space sector, and

our list concludes with a small company supplying design services to the highly competitive automotive market.

It will be no surprise to find the debate for this Award was heated, but the Judges finally selected Vocis Driveline Controls; the second year in succession that a consultancy serving the automotive market has won this Award.

Formed in 2006, Vocis' customers range from global car manufacturers to specialist suppliers in the UK. These customers access Vocis' high level of expertise in the integration, control and calibration of automotive transmission

systems, as well as what it claims to be the most advanced and most comprehensive range of transmissions for electric vehicles.

Innovation is central to the company's offering. Its technology enables customers to improve the competitiveness of its products by refining performance, boosting controllability and reducing fuel consumption.

Working with such well known names as Aston Martin, Lamborghini and McLaren, Vocis is now working with Zyteck on what is believed to be the most advanced electric vehicle yet launched.



What the Judges said:

"Top notch technology in a challenging market."

"It's crucial for car manufacturers to stay innovative and companies like Vocis allow them to do that."

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Loud and clear

While the majority of UK manufacturing and design companies are small to medium-sized enterprises, almost all of this sector comprises companies with fewer than 20 employees. And it is amongst these that the Judges were looking to select the winner of the Small Company of the Year Award.

Small is, indeed, beautiful. But not all the time. Being a small company allows you to focus sharply on your chosen market. However, unless you are agile, there's every chance that a large competitor could stand between you and a lucrative contract.

What the Judges wanted to see was a company with a sound business plan addressing a particular market need. Not only were entrants required to show an evolving product portfolio, they also needed to show their products had been well received by its customers.

ICS Electronics, which specialises in marine radio communications, ticked all



the boxes. Established in 1982, the company has grown to become a leader in its three chosen markets: coast stations; commercial; and leisure. The coast station market provides 90% of the company's revenues and 85% of its turnover comes from exports.

Not only does the company invest heavily in new product development to help it maintain its leading position, it also participates actively in promoting best practice through international committees, maritime organisations

What the Judges said:

"A company whose size belies its influence"

"It would be easy to forget this is a small company, such is its influence and global reach."

and technical forums.

ICS puts its success down to a number of factors, including: a precise focus on its markets; a full understanding of the requirements for its markets; and keeping ownership of its IP.

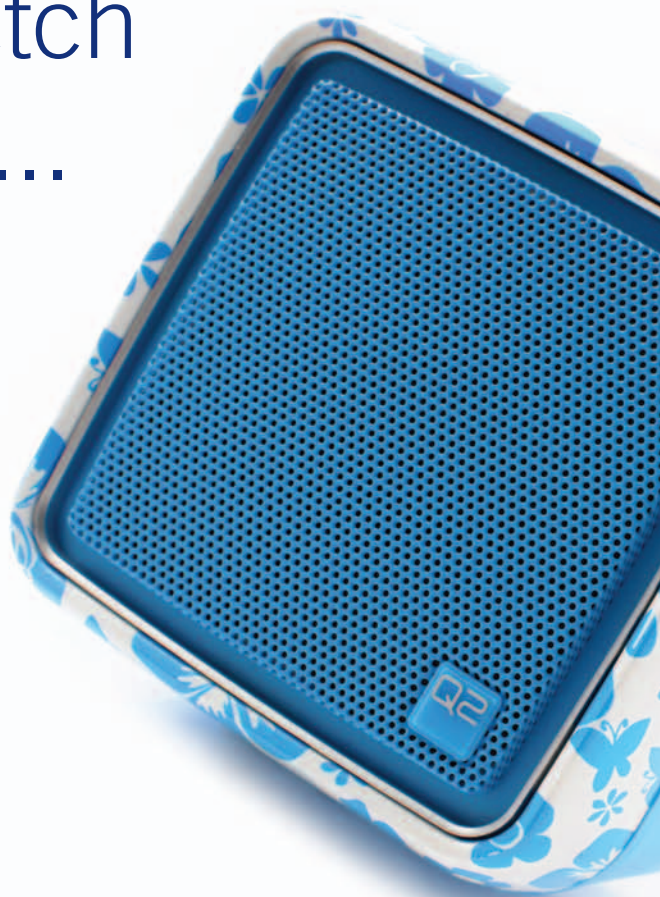
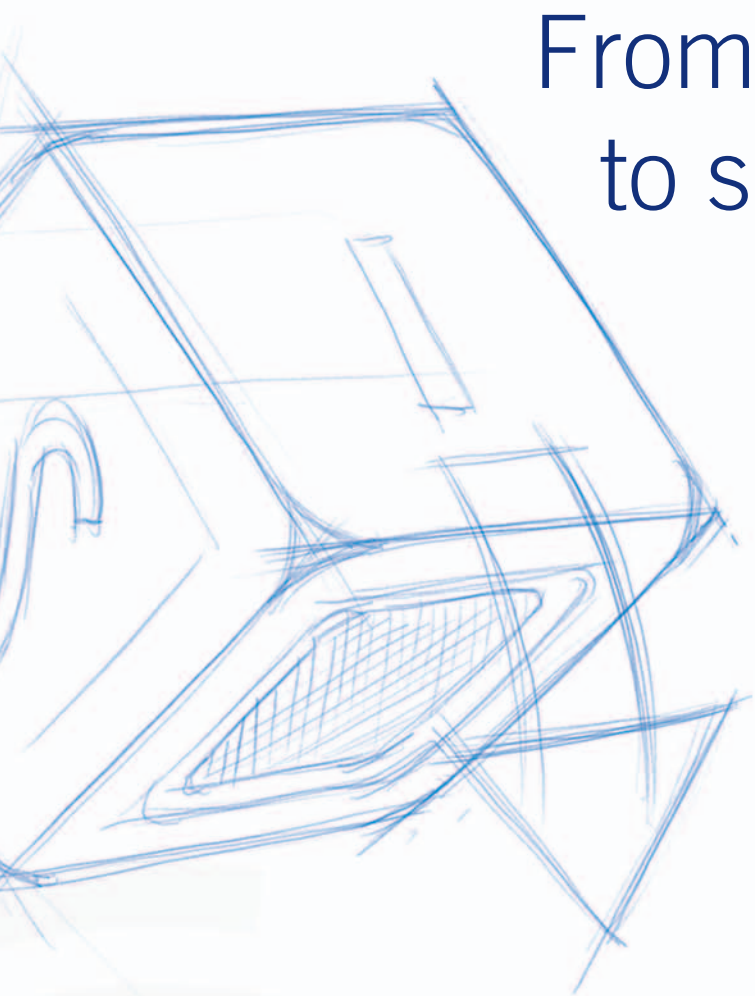
Competition for the 10-strong company comes from the likes of BAE Systems, Siemens, Nokia and Lockheed Martin. Many larger companies have tried to access the market, but few remain. Of those that do, ICS competes on the basis of a product designed specifically for the market and not adapted from generic technology.



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From sketch to shop...



Congratulations to all the finalists and winners of this year's BEEA. Like you we share a passion for developing fantastic products, with state-of-the-art engineering at their core. It's something we've been doing for over 50 years now, so have perfected the art of developing the right product and helping clients to get it to market in record time.

With you every step of the way, our engineers and designers are not just technically gifted but also focussed on creating high quality products which sell.



Innovation at its best

Highly commended

Congratulations to Cambridge CMOS Sensors, whose entry has been highly commended by the Judges.

With the current economic climate, it's no surprise to see a decline in the numbers of companies being set up. But there are entrepreneurs that are up to the challenge; particularly when there is a brand new market to exploit.

There is general agreement that the UK's economy needs an injection of pace and that start ups are just the place where this can come from. But starting a company is no guarantee of success; along with solid technology, the company needs a sound business plan and, most importantly, orders.

To qualify as a start up, a company must have been set up no earlier than

analogue to digital broadcasting.

Neul believes white space radio will deliver wide area communications in an unregulated part of the spectrum. It envisages the creation of a national network for machine to machine, or M2M, communication and believes 99% of homes can be covered with just 4000 sites.

In less than a year, the company has developed the first production ready white space radio and shipped devices

What the Judges said:

“Tremendous potential and huge opportunities. In only twelve months, Neul has developed a clear technical advantage, attracted significant funding and shipped its first product.”



the beginning of 2007. Our winner was comfortably inside that, having been established only last year by a group of entrepreneurs with a serious track record; included were some of those who were in at the beginning of Bluetooth pioneer CSR.

Neul has been set up to exploit the potentially lucrative white space spectrum; communications bands vacated by television's move from

to paying customers. It has also worked with a paying customer to install a full wide area coverage network across Cambridge and some rural areas. It says it just goes to show what a small, highly motivated team can do.

Now 16 strong, Neul has recently closed a Series A funding round of \$12million: the largest such investment in a European wireless start up for 10 years.

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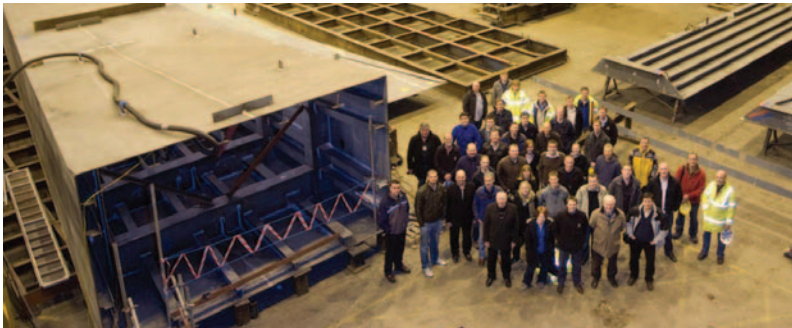
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A pipeline of business

Highly commended

Congratulations to Pelamis Wave Power's P2 Wave Energy Converter design team, whose entry has been highly commended by the Judges.



What the Judges said:

"A clear challenge met with a strong team with an innovative and effective approach."

Engineering is a people business. Engineers make things happen; sometimes individually, but more usually as teams. And a new Award this year recognises the achievements of engineering design teams.

Entries for this category could be for teams creating electronic or mechanical products or systems, as well as those combining both elements, and the teams could be have been working on new products or systems or upgrading existing ones.

Producing a design on time and to requirements is a demanding task, particularly when the customer may well want the final product to be delivered 'yesterday'. Along the way, decisions have to be made on design issues in order to meet a target price and there are always milestones to be met. The judges were looking for evidence that the final design met the original requirements and the project milestones, as well as the application of technology, the degree of innovation and overall project management.

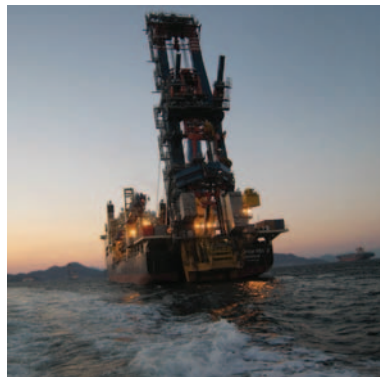
As expected, the entries covered a wide range of products and technologies: from the design of small sensors to the creation of an enormous pipelaying machine. But the winner was the team that designed the Saipem J-Lay Tower.

The system is said by IHC Engineering Business to be one of the most versatile pipelaying systems yet developed. The J-Lay Tower raises a pipe section from the vessel deck to near vertical, aligns it to within a millimetre, then welds it into position. The system can work with pipes of up to 36in in diameter, with pipe lengths

of up to 48m. All very well, but this was a 'first time build'; the company had no 'prior art' to refer to. And there was a fixed deadline.

The finished tower was shipped to a Korea shipyard for installation in May 2010 and arrived in July. Installation and commissioning was completed in March 2011 and the system was ready for operation in June 2011. More than 100 person years was committed to the project.

According to the design team, this was a complicated project, with several large engineering challenges. Overcoming them required disciplined team work of the highest order. The project was delivered on time and is ready to start work.



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Driving success in mechatronics

When readers of *Eureka* are surveyed by Findlay Media, they are asked how much time they spend on electronics design. A similar question is asked of *New Electronics*' readers: how much time do you spend in the mechanical arena? The answer is that a significant number of readers spend a lot of time in both areas and the designs on which they are working can be categorised as mechatronics.

Entries for this category had to describe the innovative application of electronic and mechanical technologies in order to solve a given problem. The design could have been developed for a client, it could have solved an in house problem, or it could be a product available on the open market.

Whatever the route, the Judges were looking at the degree of innovation applied in meeting the design brief, as well as how well the solution met marketing objectives.



Shortlisted entries ranged from a digital displacement hydraulic transmission for a wind turbine to a golf ball location system, by way of an off planet manufacturing system.

The entry which caught the Judges' eyes was the golf ball location system from RF Golf. This small company – employing just three people – had taken on a large task; creating a golf ball with integral electronics which met the rigorous requirements of the US Golf Association regarding the size, weight and performance of golf balls.

The company was looking to develop a ball in which the electronics were activated upon contact between club and ball and which could be located to within 50cm from a distance of 50m using a hand held locator unit. Locating golf balls is problematic, as all golfers will know. Some 1 billion golf balls are sold a year globally, many of which are lost. Instead of spending time looking for a lost ball, RF Golf says golfers can

spend more time enjoying the game.

However, a number of issues needed to be solved: activation of the electronics; remote deactivation; the production of durable, cost effective rf technology; and the production of a golf ball with comparable performance to conventional golf balls and a similar life expectancy. The company has received patents on its design in the UK, Europe and the US and is planning a product launch later in 2011.

As part of the testing programme, a robot produced a swing speed of 120mph; the ultimate test of whether the product was fit for purpose.

What the Judges said:

“An elegant solution to a problem faced by golfers everywhere.”

“An innovative design with potential for huge financial success.”

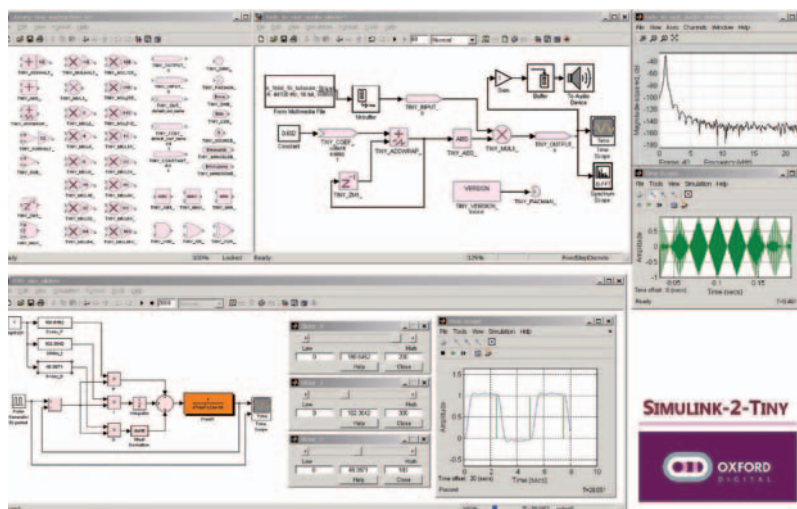
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Tiny, but with a big impact



What the Judges said:

“It has a huge impact in terms of reducing time to market.”

“An impressive customer take up in a short time. This will have an impact on development time for a range of products.”

The importance of electronics to the UK's economy is not always appreciated; neither is the size of the electronics sector. In fact, the UK's electronics sector is the fifth largest in the world, worth £23 billion a year and employing 250,000 directly and indirectly.

It should come as no surprise that a sector of such magnitude should be working on a wide range of products and the entries to this category confirmed that. And the Judges experienced their usual difficulty in coming to a decision; no surprise when the entries were so varied.

What were they looking for? Certainly the technology used and the time to market. But they also wanted an appreciation of how companies assessed the need for their product.

This year's winning entry – Simulink-2-Tiny from Oxford Digital – produces

fully-optimised code directly from Simulink in seconds. According to the company, this surpasses by around 10% in program size and execution speed what an expert programmer can achieve in months.

Oxford Digital has developed from scratch TinyCore, a low power, low gate count DSP core suitable for use in audio, closed loop control systems and in sensor applications. The core is targeted at semiconductor manufacturers, for use in ASICs, and at high end consumer electronics manufacturers, for use in FPGAs. Clients include Sony, Wolfson Microelectronics and D&M Holdings, developed of Denon and Marantz products.

Simulink-2-Tiny allows engineers who design algorithms using Simulink to eliminate the coding stage for TinyCore; the work is done automatically and the results can be

used in real time within a few seconds.

The innovative part of the design is the way in which software and hardware work together as an integrated package. And code can be produced in a matter of seconds; far more quickly than the months it can take an experienced programmer.

According to Oxford Digital, the 'Eureka' moment came when it looked at a typical work flow and realised that it could reduce time to market significantly. Simulink-2-Tiny was developed in just four months and won its first license in September 2010.

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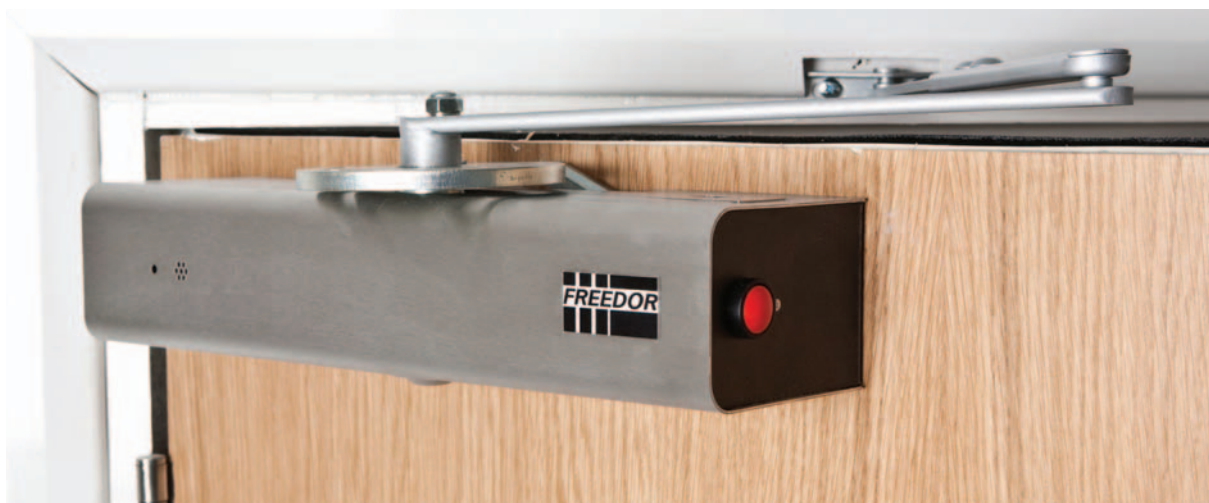
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Door closer shuts out competition



Engineering is about innovation, but that innovation need not be applied only at the leading edge of product design; there is a lot of room for the creation of products which provide an elegant solution to a particular problem.

Our shortlist this year featured a range of products; from a folding bicycle capable of being fitted into a standard sized suitcase to a hybrid powertrain with a new rotary engine. In between these apparent extremes lay a vacuum pump, a rapid manufacturing system, a solar docking station and this year's winner – Freedor, a wireless electrically powered device designed to close a fire door within 15 seconds of an alarm sounding.

In this category, the Judges were looking at the technology used and the speed with which the design was

brought to market. Freedor was seen to be a creative solution which had already demonstrated considerable sales success in the six months following its launch.

Fireco spotted a gap in the market for a wireless door closer. While a number of similar devices is available, all require hard wiring into a fire alarm panel, as well as a constant power supply.

Many buildings have fire doors held open illegally; Freedor allows these doors to be held open legally. Fireco's solution is a battery powered, self contained device featuring electro-permanent magnets. Power is saved because it is only required when releasing the door.

Freedor works by listening for a fire alarm that exceeds 65dBa and which sounds for more than 14

What the Judges said:

“It’s building a better mousetrap.”

“A clever design with demonstrable sales success.”

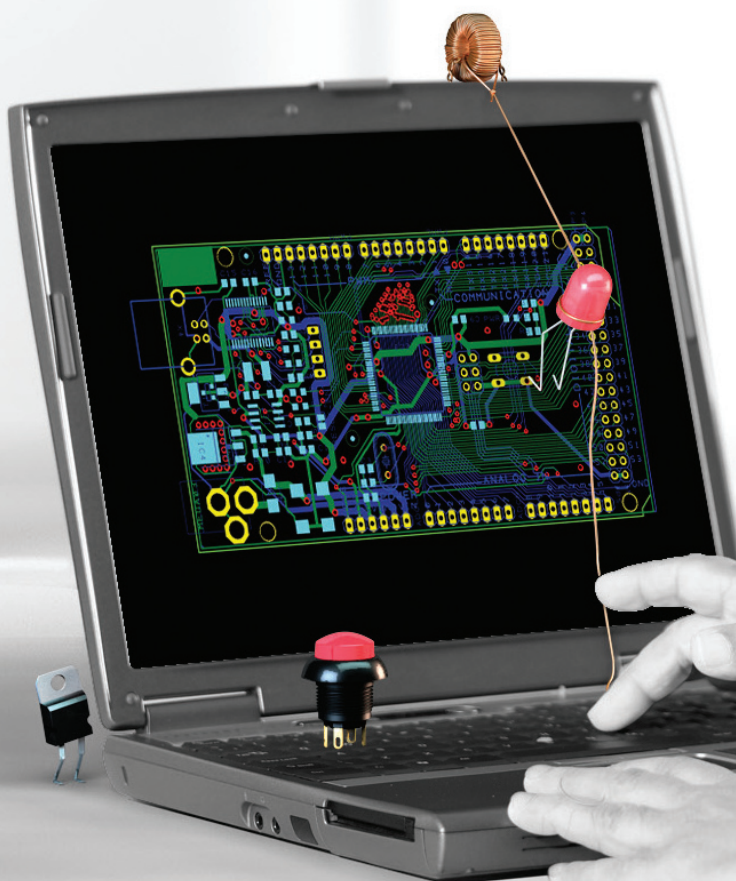
seconds. When it does, the magnets are released and the door closes. It can be used in all types of building, is particularly suited to retrofits and requires only one person to install it.

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Innovation rewarded

The issue of graduate skills continues to bubble up; employers have commented with regularity over the years that the graduates they employ don't have the necessary 'soft' skills: ranging from numeracy to interpersonal relations to team working.

To a large extent, employers want their new recruits to contribute as quickly as possible to their business, but the transition from university to the 'real world' isn't always an easy one to make. Some, however, make that jump a lot more easily than others.

What UK industry needs is good young engineers and recognising their achievements is important in inspiring optimism about the future of engineering in the UK.

The Judges were faced with some strong entries, with the shortlist cut down to four young people – Adam James, Daniel Campling, Darren Jones and Will Deacon. In deciding between them, the Judges' considered the knowledge that the young engineer has had to apply, the contribution made to the project, the degree of innovation applied and the personal qualities of the nominee, including their motivation, dedication and ability to act as an ambassador for their discipline.

It was a hard choice for the Judges to make, but their selection was Darren Jones, known to his



fellow workers as 'Dazbo' – recognising him as the least likely recipient of an ASBO. He acted as project manager for Freedor – winner of the 2011 New Mechanical Product of the Year. Not only that, he is recognised as the sole inventor of the patented rocker assembly that allows the product to operate as a door closer.

Darren started with Fireco in August 2009, joining straight from university, having spent a placement year with the company. Freedor was Darren's first project. Alongside managing the project, Darren organised focus groups, research into competitive products, virtual prototyping, finite element analysis

What the Judges said:

"A huge level of enthusiasm."

"Has developed a innovative product that is on the market and which sells."

testing, field tests, sourcing suppliers and developing the documentation.

He is now responsible for mentoring placement students employed at Fireco and, according to his employer: "His professionalism and enthusiasm have been invaluable."

Highly commended

Congratulations to Adam James, who has been highly commended by the Judges

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Dedication brings recognition

Engineering is about commitment. While it can be a 9 to 5 occupation for some, those who create the best designs don't recognise the constraints of the clock; the best ideas can come at any time. And the best engineers are often those who go that legendary 'one step further'.

Entrants for the Design Engineer of the Year Award needed to be nominated by another person. Their entry was required to demonstrate the nominee's ability to produce innovative designs within strict commercial limits and to develop transferable technology. The Judges were also looking for engineers who have contributed to their industry – maybe through participation in professional bodies and/or standards committees – and who work to promote engineering in the broader community.

Shaun Addy met many of the criteria; according to his managing director, Shaun thinks nothing of 5am starts six days a week to solve an engineering challenge.

His experience comes from more than 26 years of building, testing and designing high performance internal combustion engines at companies such as Lotus and BMW. In that time, he has won patents for many designs. His latest design is the Cubewano rotary engine, distinguished by the fact that it can run on kerosene – the only such engine in the world with this ability



and something previously believed to be impossible. The engine is designed for use in defence and aerospace applications, where a high power to weight ratio is demanded.

In the last year, he has refined the design of the engine's fuel injection system, reducing fuel consumption by 50% and this is likely to earn him another patent.

Managing director Craig Fletcher gave an example of Shaun's dedication. "He worked crazy hours in a small garage with minimal machining capabilities to create a novel engine which, to this day, has not been bettered." Cubewano has recently won a \$9million order for its engine from the US.

What the Judges said:

"With a proven track record in the automotive market, he is stepping out to be innovative in a small company, where he is taking risks, but using his experience."

"He has created a design for what will be a growing market."

Alongside his engineering responsibilities, Shaun heads the development department, mentoring and managing all development staff, ensuring they work to his methodology and design ethics.

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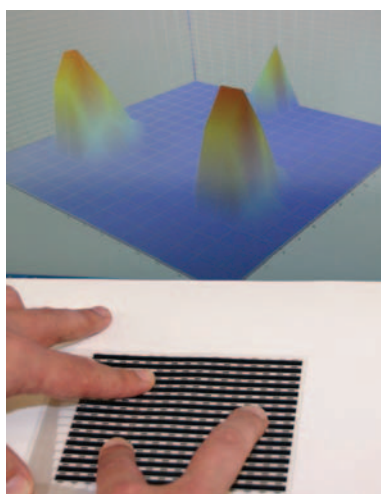
A touch of class

Each year, the judges of the British Engineering Excellence Awards have the ability to make, at their discretion, a Special Award to an entrant in any category. The Judges have a hard choice to make, because the winner may have made substantial cost reductions in a product design, found a way to shorten the design cycle or made considerable progress in taking a radically new technology to market.

As usual, the Judges were keen to recognise a company that epitomised the British Engineering Excellence Awards by combining ingenious design and solid business principles to achieve success.

The debate for this category was strong and a number of companies were considered. But the award has been made to a company whose innovation, rapid product development and technical superiority has allowed it to succeed in competition with much bigger companies.

Peratech first produced its Quantum Tunnelling Composite in 1996 and this material already finds application in robotics and defence related products. But the company's latest innovation, QTC Clear, takes it into a much different market. QTC Clear can be used to create pressure sensitive touchscreens which hold the potential of replacing resistive touchscreens and enhancing capacitive ones to create what the



company believes will be 'superior solutions'.

Peratech entered the BEEAs in 2010 and the Judges were hugely impressed by the Quantum Tunnelling Composite technology. But questions were raised about its commercial viability. Those queries

What the Judges said:

"To make money in the licensing business, you have to have something technologically terrific. Peratech has that."

were emphatically answered by this year's entry, which demonstrated impressive commercial success and promised great things for the future.

Peratech has already licensed QTC Clear to a leading touchscreen manufacturer, one agreement amongst seven 'significant' agreements. And there are two more in the pipeline.

All Peratech revenues are to overseas companies, which it says is an excellent example of British innovation generating global revenues.

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Eric Wilkinson, Chairman

Chief operating officer of Cambridge Consultants, Eric has managed projects as diverse as anti terrorism radar, a cosmetics applicator and something to liven up a can of beer! This has given Eric the insight necessary to manage some of his company's largest projects.



Colin Brown

Colin has spent 25 years in engineering, working for Rolls-Royce, BP and T&N in a range of roles. He joined the Institution of Mechanical Engineers in 2005 to support its work in promoting the value of engineering.



Andrew Burrows

With yacht design and electronics qualifications, Andrew set up i20 Water in 2005 to develop technology that would reduce leakage and burst frequency on water distribution networks.



Graham Pitcher

An engineer by training, Graham is an expert journalist who has covered the electronics industry for more than 30 years.



Paul Fanning

Paul has been a trade and technical journalist for more than 15 years. Since starting his career with Machinery & Production Engineering, he has edited a number of industrial titles. He took over as editor of Eureka in January 2010.



Ian Phillips

As principal scientist with ARM, Ian's role is outward looking, involving him with European Research Universities, Institutions and Government Bodies. An advocate of improved university/industry relationships, he is visiting professor at University of Liverpool.



Indro Mukerjee

Chief executive of Plastic Logic, Indro has held board level positions with C-MAC, Philips Semiconductors and Hitachi's European semiconductor division. He is a board member of the Sector Skills Council for science, engineering and manufacturing technologies and is founding chairman of the UK Electronics Skills Foundation.



Robin Wilson

Robin joined the Technology Strategy Board in June 2009 after 35 years in technology development and leadership in automotive manufacturing, including Rover's chief engineer for Chassis Systems and Medium Car Programs. More recently, he has focused on the research and development of lightweight, fuel efficient vehicles and shared technologies.

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Founder of the British Engineering Excellence Awards, Findlay Media is committed to UK engineering. Owning the most comprehensive range of manufacturing and engineering publications, websites and data in the UK – including New Electronics and Eureka – Findlay Media enables suppliers, associations and Government to communicate with the engineering community.

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Prototype Projects

Prototype Projects works with great companies every day of the year as part of its work and is proud to sponsor the British Engineering Excellence Awards because they allow the UK's Design, R&D and Manufacturing companies to come together and celebrate the very best of engineering.

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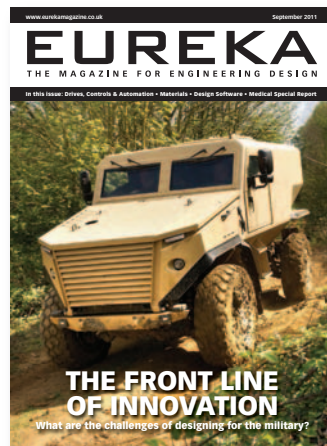
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www.totallyengineering.com

Engineering design show

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See November issues of **EUREKA** and **New** Electronics for details



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