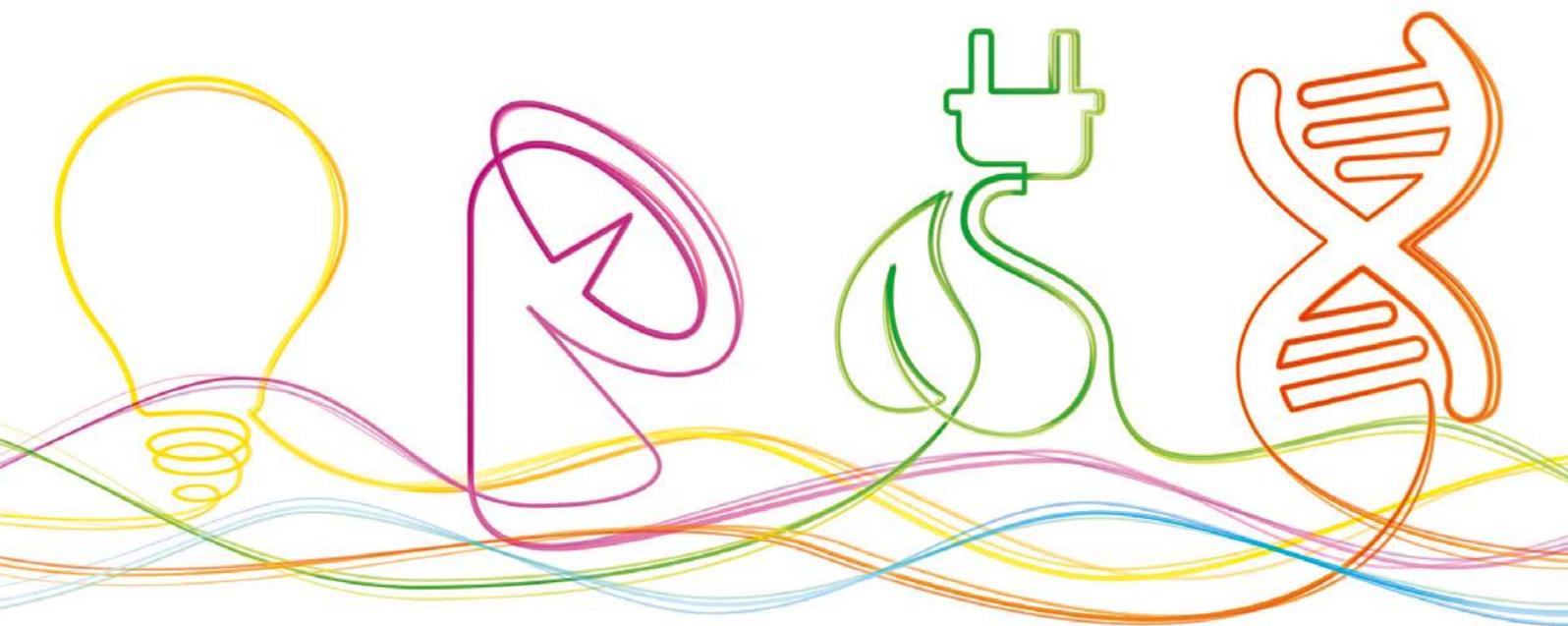


IOP INNOVATION AWARDS 2014

Innovative physics. Winning solutions.



The Institute of Physics is a leading scientific society. We are a charitable organisation with a worldwide membership of more than 50,000, working together to advance physics education, research and application. We engage with policymakers and the general public to develop awareness and understanding of the value of physics and, through IOP Publishing, we are world leaders in professional scientific communications.

In September 2013, we launched our first fundraising campaign. Our campaign, Opportunity Physics, offers you the chance to support the work that we do.

Visit us at **www.iop.org/fundraising**



WELCOME TO THE AWARDS

Physics has been at the heart of innovations from the light bulb to the Large Hadron Collider. Today, physics and physicists drive the success of the best and brightest companies.

The IOP Innovation Awards are the only awards recognising companies in the UK and Ireland that have built success on the innovative application of physics – companies that have generated profit, secured jobs and improved efficiency across a range of sectors, from oil and gas to renewable energy, medical technologies to high-tech manufacturing.

Introduction



Dr Frances Saunders
CB FREng CEng CPhys FInstP
President, Institute of Physics

PHYSICS MEETING OUR GLOBAL DEMANDS

Energy supply, national security, protecting our environment and driving economic growth. These are some of the most important challenges of our time, and the four winners of the IOP Innovation Awards 2014 are rising to meet them.

All of the 2014 winners have taken physics research and development, in some cases work that began in the most esoteric and abstract fields, and turned it into highly successful products and businesses. The products they have created have given UK forces an unmatched capability on the battlefield, secured energy generation in north Wales, provided a means to better monitor CO₂ emissions, and driven a revolution in telecommunications and advanced manufacturing. Their products help us to meet national and global challenges, while their businesses create jobs and growth in the UK.

This success is, of course, a testament to their hard work and ingenuity, but also to the UK's world-leading research base, and the practical skills and expertise of our physics-trained workforce. I think we can say that physics is now an essential part of our national infrastructure.

I congratulate all of this year's winners and wish them every success for the future.

““ Our IOP Innovation Award has been very useful for us in developing our business over the past year. The international reputation of the Institute of Physics has particularly helped us as we continue to expand our sales in markets such as the US and China. ””

Dr Philippe Young, Managing Director and CEO, Simpleware Ltd
IOP Innovation Award 2013 winner

““ The IOP Innovation Award has been a fantastic fillip to Coherent Scotland’s reputation, not only to external stakeholders, but also to the internal organisation and our own employees. Both our product sales and abilities as a production facility have seen tangible benefits. ””

Darryl McCoy, Product Marketing Director, Coherent Scotland Ltd
IOP Innovation Award 2013 winner

The winners

GAS SENSING SOLUTIONS LTD

For developing and commercialising an optical-based carbon-dioxide (CO₂) gas sensor. The low-power sensor allows for greater accuracy and energy savings for customers in a range of markets.

Elevated CO₂ levels inside buildings can have potentially harmful health effects. Current and incoming legislative requirements are driving demand for low-power-consumption, long-life and wireless-compatible CO₂ gas sensors. To meet the requirements, these sensors must be able to stabilise – power up, take a measurement and power down – as quickly as possible.

Non-dispersive infrared (NDIR) sensors are the most widely used for real-time measurement of CO₂. Standard NDIR sensors use an incandescent bulb and pyroelectric detector combination, which require optical filters, take time to stabilise and can use a lot of power. The GSS solution uses novel mid-infrared light-emitting diodes (LED) and photodiode (PD) detectors. The LED and PD can be precisely tuned to the absorption wavelengths of the gas to be detected without the need for an additional optical filter. This combination offers low power consumption and minimal stabilisation time.

The GSS sensors are wireless-compatible, portable, accurate and can be battery powered. As a result, they are finding a growing number of applications, including industrial safety, building control and horticulture. In diving, the technology is being incorporated into rebreathing apparatus, where it provides a valuable enhancement for customers.



The company

Gas Sensing Solutions (GSS) Ltd was founded in 2006 to develop and manufacture unique, high-performance CO₂ sensors. The company began trading after two years of research and development, and trademarked sensors are now in full production at the company's Glasgow facilities.

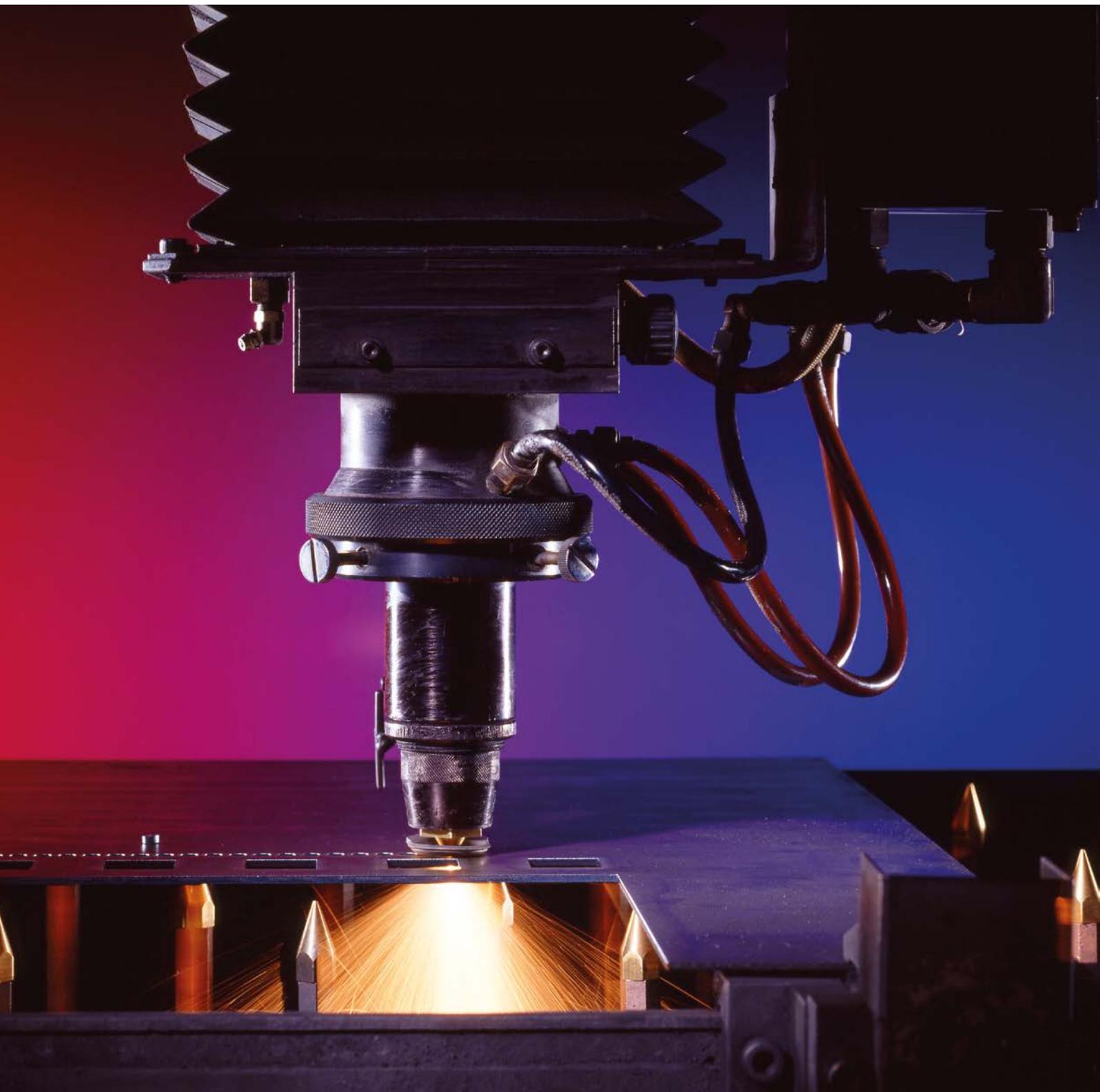


46

countries shipped to



The winners



GOOCH & HOUSEGO

For the development of a fibre-coupled acousto-optic modulator device for integration into fibre-laser systems. The Fiber-Q is used to modify the laser beam in systems used in a range of markets and applications, from oil and gas security to medical lasers.

The rapid adoption of fibre-laser technology used for materials processing in manufacturing has led to massive advances, enabling high throughput and low-cost manufacture of consumer items such as smart phones. Compared with other laser technologies, fibre laser provides a robust, low-cost, maintenance-free solution.

In fibre lasers, the laser cavity comprises a length of active single-mode fibre with a very small core diameter, meaning that it can be challenging to modify the properties of the laser beam to optimise processes. To address this, Gooch & Housego developed Fiber-Q – a device able to modify the amplitude, direction and wavelength of the laser beam with precise electronic control. The innovation is based on an understanding of the interactions between light and sound waves that can occur in an optically transparent material.

The components can be integrated into any fibre-laser system, enabling manufacturers of fibre lasers to ensure that their products meet the demands of clients. The low-cost and robust practical application of the Fiber-Q solution is benefitting customers working in a range of markets, from oil and gas security to medical lasers.



The company

Gooch & Housego is headquartered in Ilminster, Somerset, with operations in the US and Europe. The development of Fiber-Q required major cross-company collaboration between the team in Torquay, where the project was managed, and the Ilminster facility, who fed in their expertise in the field of acousto-optics and optical materials.



25%
cumulative growth
since 2009

The winners

MAGNOX LTD

For developing and implementing an innovative method of refuelling Wylfa nuclear-power station's Reactor 1. The transfer of fuel from Reactor 2 has allowed for continued energy generation at the site.

Wylfa nuclear-power station on Anglesey has relied on a regular supply of new fuel to enable electricity generation. As part of the Nuclear Decommissioning Authority (NDA) strategy, the date for final shutdown of its two reactors was originally co-ordinated with closure of the Springfields fuel manufacturing plant and the spent-fuel reprocessing plant at Sellafield.

Physicists at Magnox recognised that generation could continue at Wylfa if low-irradiation fuel from the permanently shutdown reactor was transferred to the remaining operational reactor. The Inter-Reactor Transfer project was the first of its kind in the UK, and required the team to overcome several challenges in the areas of reactor operation, fuel management and plant safety, as well as meeting practical, physical and regulatory constraints.

The innovation is extending energy generation at Wylfa by around three years and having a huge impact on the local and national economy. On Anglesey, 157 jobs have been saved and a qualified, experienced workforce has been retained. The project has the potential to generate an estimated extra 2.6 TW of electricity – providing an extra £100 million of income for the NDA.



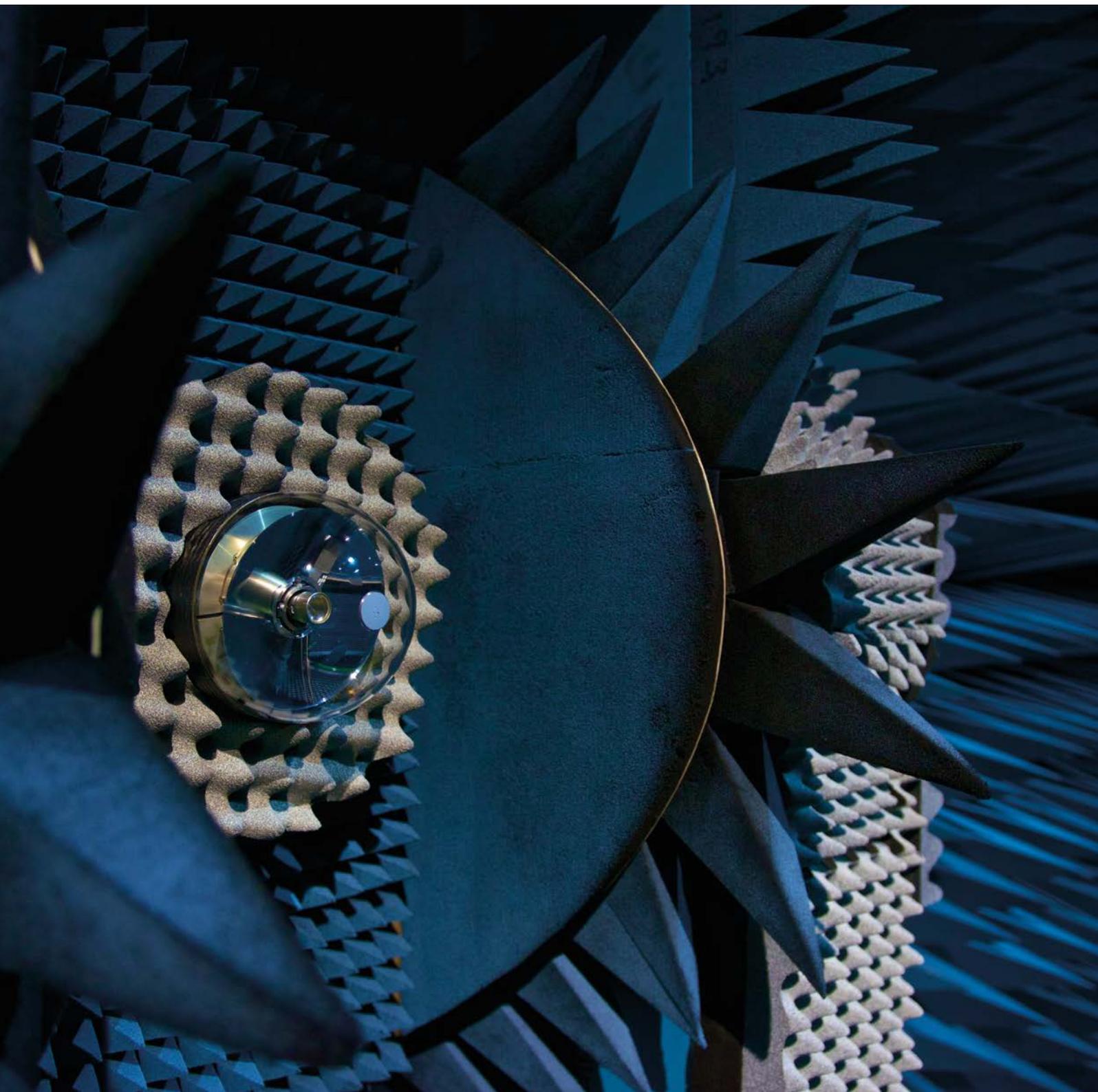
The company

Magnox Ltd, owned by Cavendish Fluor Partnership Ltd, is the site-licence company responsible for safely, managing 10 nuclear sites and one hydroelectric plant in the UK, working for the sites' owner, the NDA. The Reactor Physics, Faults & Hazards team is based at Oldbury Technical Centre, Oldbury-on-Severn.



£100 million
extra income for the NDA

The winners



MBDA UK LTD

For the development of a missile-system upgrade that combined two guidance modes for greater precision. The innovation has provided new capability for UK and coalition armed forces.

In 2007, in response to the situation in Afghanistan, the Royal Air Force issued an Urgent Operational Requirement for a precision weapon to defeat a range of static and fast-moving targets in restrictive rules of engagement. The requirement included “man-in-the-loop” capability, allowing human operators to reduce the possibility of collateral damage.

To meet this requirement, MBDA developed the Dual Mode Brimstone missile by introducing an upgrade to the existing Brimstone seeker and guidance systems. This was achieved by adding a semi-active laser-targeting mode to the original millimetre wave sensor (without increasing its size), and by data fusion between the two sensors. Innovation lies within the optics, the mechanical design and the processing, with 80% of the original components retained and the new design requiring only a modification to the existing seeker and revised software.

By making maximum use of the original components, MBDA was able to deliver this upgrade for the cost of a comparatively small incremental development. Dual Mode Brimstone’s greater acquisition range, accuracy and agility now provides UK and coalition armed forces with a unique and transformational capability.



The company

MBDA is a multinational group with 10,000 employees working across France, the UK, Italy, Germany, Spain and the US. It is the first truly integrated European defence company and works with more than 90 armed forces worldwide. The UK has three sites, including Stevenage, where research and development takes place.



£145 million
generated in value added

PAST WINNERS

2012

Aurox Ltd
Displaydata (formerly ZBD Displays Ltd)
Naneum Ltd
The Technology Partnership plc

2013

Coherent Scotland Ltd
Elekta Limited
Simpleware Ltd
Tracerco
Zephir Ltd

“Winning the Institute of Physics Innovation Award is a tremendous boost for Tracerco. It’s particularly good that it brings light and prominence to the tremendous work that our scientists do in the background in the development of all the products that we take to market.”

Andy Hurst, Managing Director, Tracerco

“Overall, the benefits to our company, in terms of publicity and other aspects, have been greater than I realised when I first submitted the application.”

Dr Michael Harris, Chief Scientist, Zephir Ltd

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