



Fusion Business

tomorrow's technology for today

DIAMOND COLLABORATION AIDS FUSION RESEARCH

De Beers Industrial Diamonds (Debid) and the Special Techniques Group (STG) at UKAEA Culham have worked together to make a world beating product of significant benefit to the fusion research community around the world.

Industrial diamond materials synthesised via chemical vapour deposition (CVD) techniques are relatively new, as are many of the applications. However, Debid have developed a CVD diamond synthesis and processing capability that allows large diameter windows to be accurately fabricated with extremely low dielectric loss. This, in conjunction with other extreme properties available when using diamond, such as exceptionally high thermal conductivity and low thermal expansion coefficient, make diamond the ultimate transmission window for high power radiation. Mounted into a vacuum-tight wave-guide flange, such windows are ideally suited as output windows for the 1 Megawatt gyrotrons used for Electron Cyclotron Resonant Heating (ECRH) of fusion plasmas.

STG at Culham was commissioned to undertake a programme of development by which the method of mounting Debid's gyrotron windows has been perfected. The resulting collaboration between the two organisations has yielded excellent results, essentially a hermetically sealed diamond window capable of transmitting 1 MW of Continuous Wave (CW) radiation at a heating frequency of around 140GHz. This unique diamond component is now allowing research groups around the world to investigate the high-power ECRH of plasma and shortly there may be diamond windows in every ECRH experiment. Debid and STG are also investigating the fabrication of other "market redefining" bonded diamond components, based on the success of their gyrotron window development.



An STG bonded CVD diamond window mounted into a gyrotron wave-guide assembly—a window capable of being baked at 450°C and withstand 144 GHz, CW radiation at a power of 1 MW.

CULHAM WORK PRAISED

Two independent reports published by the government have confirmed the quality and efficiency of the fusion programme at Culham. UKAEA has welcomed the highly complimentary reports by AD Little and a panel of physics professors.

Following government reviews of fusion policy and the work of UKAEA, it has been agreed that the fusion programme will remain part of UKAEA, but funding of the UK fusion programme will transfer to the Office of Science and Technology within DTI. A Fusion Advisory Board will be created to provide technical guidance, strengthen links with the wider science community and with industry, and help develop a stronger fusion identity.

UKAEA also welcomed the government's identification of fusion power as a realistic energy resource in the medium term.

£4M FUND OPPORTUNITY

UKAEA Fusion and Industry Liaison Co-ordinator Miriam Mason says a new technology fund announced by the government offers "an excellent opportunity" for UK industry. The £4m Rainbow Seed Fund will invest in early stage technologies to bring them to 'proof of concept level', ready for further commercial investment.

The initiative is led by the Central Laboratory of the Research Councils (CLRC), the Defence Science and Technology Laboratory and the Natural Environment Research Council. UKAEA is an associate partner along with the Particle Physics and Astronomy Research Council and the NHS Scotland consortium.

Miriam Mason says: "One aim of the Fusion & Industry initiative is to promote an entrepreneurial culture, encouraging the formation of spin-out companies and maximising the benefits to industry of fusion expertise. This Fund offers an excellent opportunity to help staff explore the commercial viability of their ideas and take full advantage of Culham Innovation Centre."

CULHAM WELCOMES LEADERS

Culham Science Centre welcomed 33 emerging leaders from all sectors in Oxfordshire for one day of an 11-day Common Purpose programme to inspire them to play a broader leadership role in the area and society.



Visits during the Wealth Creation day included tours of JET and MAST at Culham, Infineum UK, Oxford Instruments, Sharp Laboratories, Isis Innovation and the Ethnic Minorities Business Service. One participant, Gill Nineham, Editorial Director of Radcliffe Medical Press, said: "This was a fantastic opportunity to learn about fusion research—something I knew nothing about!"

"One of the great benefits of Common Purpose is that participants can question experts directly and see what Oxfordshire looks like from other people's perspectives," says Programme Director Rosie Hallam (pictured right with Senior Programme Co-ordinator Alix Michaelis).

Contact Common Purpose on 01235 555264 or by email oxford@commonpurpose.org.uk

HIGH-FLYING NEW TENANT AT CULHAM INNOVATION CENTRE

The Culham Innovation Centre has a new, high-flying company with the arrival of ACRO Aeronautical Services Ltd. A Civil Aviation Authority approved aeronautical engineering consultancy, ACRO offers a broad range of engineering skills, particularly structural analysis.



'Wing walking' pylon designed by Acro Aeronautical for the 2001 'Utterly Butterfly' aerobatic team. The wing rider can rotate about the forward and vertical axes. The aircraft is a Boeing Stearman.

Formed in 1983 by Andrew Lawler and Dave Starkey, ACRO has worked on projects as diverse as restoring World War II aircraft through to developing welding guns for robotic arms on automotive production lines. Most recently the company was involved in hanging a Harrier jump jet in the new Imperial War Museum in Manchester.

Director Andrew Lawler says: "We offer the kinds of specialist engineering skills that companies simply no longer have in-house. Our approach is to draw on a pool of chartered engineers and designers for each new project, bringing to bear the right skills to solve a problem quickly and efficiently."

ACRO say the convenient location and the Technical Support Package, available to suitably qualified occupiers of the Innovation Centre, were deciding factors in their decision to move to Culham. Andrew Lawler says: "The Technical Support Package will provide IT support services, allowing us to configure our computers and network to best effect."

For more information about the Culham Innovation Centre, please contact its manager Barbara Allsworth at b.allsworth@oxin.co.uk or call 01865 408300.

INTRODUCING...

Culham-based staff had the chance to see an example of the world's first 60-inch display panel during an exhibition at the Science Centre.

The exhibition of the products and services offered by Total Audio Visual Solutions Limited (Total AV), based at



Culham, featured a 60" Plasma Screen manufactured by LG Electronics. Andrew Hawkins of Total AV says: "The feedback we have received following the event has been extremely positive and we are certain that we

achieved our main objective which was to promote the products and services we offer."

More than 100 people entered a free prize draw to win an LG DVD Player. It was won by Des Mitchell of AEA Technology (pictured above left). For further details please visit www.totalav.co.uk.

Another recent exhibitor at Culham, Calex Electronics, also hailed their visit as a great success.

Calex, who are temperature and power conversion specialists, have been supplying electronic equipment to Culham for many years. They were keen to give existing users the opportunity to provide feedback, make a wider cross-section of engineers aware of their capabilities and introduce some new products.

Calex specialise in the design and manufacture of non-contact infrared temperature sensors and systems, AC/DC power supplies and DC/DC converters, and market a wide range of temperature instruments. Contact info@calex.co.uk or call 01525 373178.



COMPANY FINDS UKAEA SUPPORT "INVALUABLE"

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The support and expertise of staff at UKAEA Culham have helped a local company save time and money in developing new products.

A.S. Scientific Products Ltd at Abingdon in Oxfordshire specialises in the technology of liquefied gases, and has over many years acquired significant expertise in industrial and research cryogenics, and vacuum and process engineering. Much of their work involves developing and installing customer-specific applications for organisations such as CERN, CLRC and food, chemical and pharmaceutical producers.

A.S. Scientific's design engineer Dr Beth Evans says: "A particular strength of the company lies in our ability to undertake development and prototype projects. For this work we may need to use equipment or services not available in our factory, and this is when help from UKAEA Culham has proved invaluable to us. We have been able to use, for design and development work on new products, specialised computer programs created at UKAEA. These programs have enabled us to model and check the feasibility of designs before manufacture, saving us time and money. We have thus greatly benefited from the support and expertise of staff at UKAEA Culham."

A.S. Scientific's range of products includes: cryostats, vacuum furnaces, sample environment equipment, vacuum insulated pipelines, phase separators, and temperature control systems. For more details email pwiggins@asscientific.co.uk or call 01235 533060.

...AND NOW ON CD-ROM

The CD-ROM developed to help promote the take-up of technology transfer opportunities from fusion research is now available, and a copy is included with this issue.

If you would like further copies please call 01235 463296 or email deniese.willis@ukaea.org.uk

SMART AWARD FOR TWO CULHAM INNOVATORS

Two companies in the Culham Innovation Centre - Alan Bond and his colleagues at Reaction Engines Ltd (featured in Fusion Business 16) and Oxford Scientific (Fusion Business 15) - have won SMART awards from the DTI.

Oxford Scientific won a SMART award to develop new vacuum coating technology for university researchers and the semiconductor and optoelectronics industries.

The feasibility study award will be used to research a novel plasma ion source that will provide improved layer quality and be more user-friendly than existing instruments used in vacuum coating and semi-conductor device manufacture.

Oxford Scientific's Christian Bradley says the SMART award provides much needed funding during the critical development phase and will allow the company to



Christian Bradley (Oxford Scientific) and Richard Varvill (Reaction Engines) pictured with Culham Innovation Manager Barbara Allsworth and UKAEA's Fusion & Industry Manager Cleve Forty (left).

substantially expand its product range.

Reaction Engines' heat exchanger technology is designed for engines that will eventually power space planes flying at speeds in excess of Mach 6.

The SMART award feasibility study funding will lead to production of a fully functioning heat exchange module based on the high nickel alloy Inconel 718. Managing Director Alan Bond says: "The successful peer review of our award application gives a tremendous boost to our credibility when competing for future venture capital funding."

Over the next nine months Reaction Engines engineers will be working closely with the Special Techniques Group at Culham to complete the development, drawing on the consultancy services available as part of UKAEA's Technical Support Package.

TECHNOLOGY 2002

State-of-the-art solutions to some of the nuclear industry's problems will be on display during April and May when the annual 'Technology 2002' series of exhibitions opens its doors to visitors at six venues around the UK.

During each of the one-day events, visitors will see a range of new and pioneering engineering technologies which may offer some exciting new opportunities in areas relating to fusion, nuclear waste management, decommissioning and the defence market.

Working closely with UKAEA, BNFL and AWE, the organisers have created an exhibition which will be of particular interest to those in Design & Development, Maintenance, Operations, Fusion, Decommissioning, Waste Management, Process Control and Procurement.

During April the exhibition will visit: BNFL Risley (Wed 10th), AWE Aldermaston (Tues 16th), UKAEA Winfrith



Sellafield - Technology Exhibition 2001.

(Wed 17th), UKAEA Culham (Wed 24th), BNFL Sellafield (Tues 30th), and the exhibition will be at UKAEA Dounreay on Wednesday 22nd May.

Further information from Nu-Tech Associates Ltd on 01946 695554 or e-mail: sales@nu-techassoc.co.uk.

People Spin Off will return in Fusion Business 19.

Any comments? Are there any subjects you would like to see covered in future editions of Fusion Business; do you have any comments on this edition? If so, please contact miriam.mason@ukaea.org.uk or call 01235 464104.