



Fusion Business

tomorrow's technology for today

FUSION SPRINGBOARD TO COMMERCIAL SUCCESS

What happens when a Small and Medium size Enterprise (SME) realises that it has developed a product of potential value to fusion research worldwide? One such company is QMC Instruments Ltd.

In the early 1970s, scientists at Queen Mary College (London University) were developing a new type of millimetre-wave (short wavelength microwave) detector for use in astronomy. At about the same time, fusion physicists were developing a new plasma diagnostic technique based on measurement of the millimetre-wave radiation emitted by fusion plasmas. The new detector had exactly the characteristics they were looking for: high sensitivity, large bandwidth and good optical access when built into the liquid helium cryostat used to cool it.

Following successful implementation on JET, the college began marketing the detector to other fusion laboratories through a spin-off company, QMC Instruments Ltd. The company offered complete millimetre-wave detector packages to the world's fusion laboratories. Further detector development of sophisticated filters to block unwanted thermal radiation, without sacrificing signal, extended the interval between liquid helium refills from 5 days to a month.

By the early 1990s, most of the leading fusion laboratories had enough detectors. At this point, QMC Instruments was able to use its expertise to adapt the detectors for non-fusion applications. Today, fusion laboratories account for only a small part of its more than 1M Euro turnover. It sells sophisticated detectors for space research, laboratory spectroscopy and remote sensing, and new applications are opening up in biological and medical research.

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ITER NEWS LATEST: EUROPE OFFERS TO HOST FUSION'S 'NEXT STEP' REACTOR

The European Union has submitted proposals to host fusion's next step machine, ITER. Sites at Cadarache in France and Vandellós in Spain were put forward at a meeting of ITER negotiators from Canada, the EU, Japan and the Russian Federation. At the same meeting, Japan tabled an offer to host ITER at Rokkasho-mura in the Aomori Prefecture. Canada had earlier proposed a site at Clarington, Ontario.

Delegates at this, the fourth meeting of the negotiators, also discussed an agreement to initiate the construction of ITER, and related technical issues such as the site assessment process, approaches to cost sharing and procurement, and the structure of the eventual international organisation for ITER.

Please note: the Fusion and Industry Programme 'ITER Awareness' seminar at Baylis House Conference Centre, Slough in Berkshire, will now be held on Tuesday 22nd October 2002. Details from deniese.willis@ukaea.org.uk or call 01235 466608.

SCIENCE MINISTER LAUNCHES £4M RAINBOW 'SEED' FUND



Photograph courtesy of the Rutherford Appleton Laboratory

Pictured L to R: UKAEA Fusion and Industry Manager Cleve Forty, Lord Sainsbury and UKAEA's Miriam Mason

Minister for Science and Innovation, Lord Sainsbury of Turville, launched the £4M Rainbow Seed Fund, which has been set up to invest in early stage technologies to bring them to the 'proof of concept' level.

"Rainbow is designed to be an on-going, self sustaining fund that benefits from the commercial success of ideas as they come to market," says UKAEA representative for Rainbow and Industry Liaison Co-ordinator, Miriam Mason. "Ideas are subjected to a rigorous process of assessing the market opportunity, IP potential and quality of science," she explains.

Early indications suggest that staff and contractors are attracted by the Rainbow opportunity. The Rainbow partners are: Central Laboratory of the Research Councils (CCLRC), the National Environment Research Council, the Defence Science and Technology Laboratory, UKAEA and the Particle Physics and Astronomy Research Council (PPARC).

STOP PRESS STOP PRESS STOP PRESS

Our new Fusion and Industry Programme brochure called "People who Make a Difference", and detailing the people spin-off benefits from fusion research, will be sent to all Fusion Business readers very soon.

Our updated website with new pages and features has now gone live at www.fusion.org.uk/industry.

Your view Are there topics you would like to see covered in Fusion Business; do you have comments on this edition? If so, please contact deniese.willis@ukaea.org.uk or call 01235 466608.

MAST IMPROVEMENTS

Researchers at UKAEA's Culham Science Centre in Oxfordshire are using state-of-the-art laser techniques to increase current understanding of fusion related physics, particularly plasma physics. Early trials of the new laser system and the associated measuring equipment, or "diagnostic", developed in conjunction with Walsh Scientific Limited, have already helped improve performance and control of plasmas in the Mega Amp Spherical Tokamak (MAST) experiment at Culham.

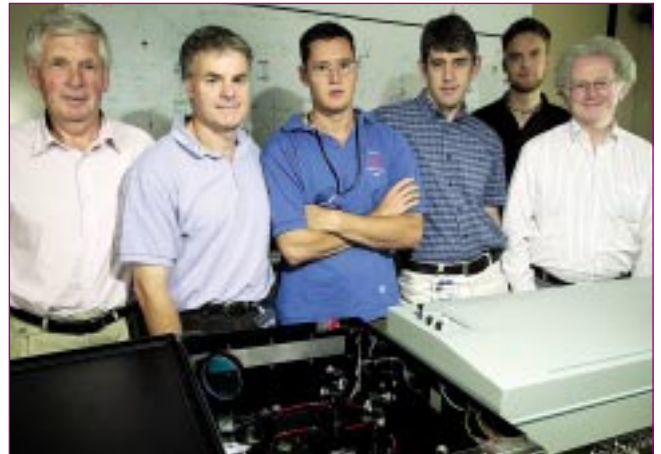


Photo shows part of the team involved in the implementation of the new diagnostic, pictured from left to right, UKAEA's Michael Forrest, Martin Dunstan, Roger O'Gorman, Walsh Scientific Limited's MD, Michael Walsh and UKAEA's Stefan Neilsen and Patrick Carolan in front of a section of the high power laser beam combining optics for the new Thomson scattering system on MAST.

Laser diagnostics are used to measure the plasma's temperature and density by Thomson scattering. The new system is already giving 100 measurements per second, allowing researchers to study the evolution of the plasma discharge in great detail. "Walsh Scientific Limited's involvement allows us to marshal our scarce resources in overcoming limitations in the diagnostic techniques at our disposal" says Patrick Carolan, the diagnostic group leader on MAST at Culham.

A major benefit of the new diagnostic is in collecting all the measurements during a single plasma discharge. "Until we had the new system it was necessary to perform a sequence of plasma discharges to obtain data on the temporal development of the plasma electron temperature and density profile in MAST. That method not only made inefficient use of experimental programme time but, more worryingly, presupposed that each discharge very closely resembled all others in the sequence" explains William Morris, Head of Experiments Department at Culham.

The new infra-red laser system complements an existing single shot visible-light laser diagnostic "Both systems are designed to be flexible to suit the needs of a changing physics programme, allowing adaptable use of the existing equipment and future expansion," says Walsh Scientific Limited MD, Mike Walsh.

FUSION AND INDUSTRY PROGRAMME MAKES MODEL CONTACT

Two companies, brought together by the Fusion and Industry Programme, are working to optimise the performance of the first of a new generation of high performance neutron transport detectors.

N2N Neutronics, specialising in the application of Monte Carlo modelling techniques, is working with nuclear measurement solutions provider, ANTECH to optimise the performance of the first of a new generation of high performance neutron based measurement systems.

From its offices in Oxfordshire, UK and Denver, USA, ANTECH develops, designs, manufactures, markets and services a range of instruments and systems for the measurement of special nuclear materials for both safeguards and nuclear material accountancy, including nuclear waste measurement.

Faced with the need to model the performance of a new Differential Die-away neutron emission monitoring system for a nuclear waste project for the Joint Research Centre at Ispra in Italy, ANTECH contacted UKAEA for assistance in validating its Monte Carlo modelling code. The Fusion and Industry Programme put ANTECH in touch with Culham Innovation Centre based company N2N Neutronics. Following the validation of the code, ANTECH then contracted N2N to model the new neutron transport detector.

*The ANTECH
Differential
Die-away
monitoring
System*



“We wanted to confirm our design before starting to build the instrument. A key parameter in a machine of this kind is the degree of shielding. N2N Neutronics work has allowed us to optimise the shielding to screen out background neutrons without affecting the machine’s sensitivity,” said Dr John Mason, Managing Director and founder of ANTECH Inc.

“The Monte Carlo technique is particularly good for this kind of application where extremely complex systems can be modelled on the computer. We are able to use our experience to quickly develop precise models that allow examination of the effects of design choices without the need for costly rebuilds.” explains Mike Loughlin of N2N Neutronics.

Can the Fusion and Industry team help make a connection for your business? If you think we can, please call **Cleve Forty** on **01235 466607**

DELEGATES' VARIAN INSIGHT



Varian Vacuum Technologies returned to the Culham Science Centre to host a day-long seminar on High and Ultra High Vacuum, following a successful exhibition here last year. Varian’s Nasser Boston says: “We had an excellent day getting to know new contacts. The seminar was an interactive forum where delegates discussed vacuum needs and issues with Varian’s Johan De-Rijke.” (pictured above). For further information contact penny.gallop@varianinc.com.

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QMC Instruments is currently supplying frequency selection and polarising control optical components for NASA’s Stratospheric Observatory for Infrared Astronomy (SOFIA) project. SOFIA is an airborne observatory that will study the universe in the far-infrared spectrum.

Sales and Marketing Director, Ken Wood, says: “By investing in development to satisfy the demands of the fusion community in the early years, we produced mature and improved products that have found applications in many other areas. We are proud of the contributions we have made to scientific endeavour, but it would never have got off the ground without the impetus provided by the fusion community.”

For more information on QMC Instruments Ltd visit www.terahertz.co.uk

Based on an article originally published in the EFDA Newsletter.

VISITORS 'VERY ENCOURAGED' BY NEW CONTACTS

Berkshire-based **Fluid Controls Ltd** made a return visit to the Culham Science Centre with the Parker Hannifin Instrumentation Roadshow, a mobile exhibition unit with a full complement of sample products to allow hands-on presentations to be made. This included Parker's range of instrumentation fittings, valves, PFA/PTFE products, hose/tubing/quick connects and pressure regulators. Along with these Parker Instrumentation products, FCL demonstrated its range of complementary lines, including pressure gauges, solenoid valves and filtration products.



Sales Engineer Adrian Williams says: "We had an excellent day, making lots of new contacts and catching up with existing customers."

For more information contact: Adrian Williams on 0118 981 1004 or email sales@fluidcontrols.co.uk or via www.fluidcontrols.co.uk

If your company has a mobile exhibition vehicle you would like to bring to the Culham Science Centre to host your exhibition, please call 01235 466608 or contact deniese.willis@ukaea.org.uk

Staging exhibitions at Culham is increasingly popular. Other recent exhibitors included the following:

Enco Engineering (Hants) Ltd from Christchurch, Dorset, displayed a range of precision-machined components. Enco is part of the CDS group of companies and has been in the contract design and manufacturing industry for more than 30 years. Sales Engineer Brian Harris says: "Although we have been supplying UKAEA for many years, the location gave us the opportunity to promote our services and the response has been very encouraging."

For more information contact: Brian Harris on 01202 482711.

Views expressed herein do not necessarily reflect those of EURATOM/UKAEA Fusion Association. No liability is accepted whatsoever for errors or omissions in Fusion Business. This work is funded by EURATOM and the UK Office of Science and Technology.



OMEGA Engineering Ltd exhibited their comprehensive range of 100,000 products for process measurement and control, through their website www.omega.co.uk and handbooks, and attracted many visitors. "The exhibition gave us the opportunity to update our existing customers and introduce the OMEGA range to a host of new contacts," says Brian Agger, Sales Engineer.

For more information email sales@omega.co.uk or FREEPHONE 0800 488 488.

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Hepco Slide Systems

are a British company which has been manufacturing linear and rotary slides for more than 33 years. "We started with 3 basic products in the range but with our policy of



continual improvement that's now been increased to 21. We need to show our customers the improved opportunities now available to them so we were delighted to exhibit our products at Culham and were very pleased to receive some good enquiries," says John Palmer, UK Sales Manager.

For more information contact: John Palmer on 01884 257000 or email hepco@hepco.co.uk.

UKAEA AT IOP CONGRESS

Delegates and fellow exhibitors visited the UKAEA Fusion and Industry stand at this year's Institute of Physics Congress Exhibition, attracted by a rolling presentation from the 'Fusion with Industry' CD.



The Mayor of Brighton and Hove City Council, Councillor Harry Steer, is pictured at our stand with Fusion and Industry Events Co-ordinator Deniese Willis and Anthony Webster of UKAEA.