

# Technology Exhibition and Seminar at Culham

In May, Culham Science Centre played host for the third time to Nu-Tech Associates annual series of Technology Exhibitions. 25 companies exhibited offering a wide range of engineering and nuclear services.

**D**eniese Willis, Fusion and Industry Events Manager stated that "The Technology Exhibition builds on the success of the individual supplier exhibitions that are now a regular feature at Culham. They clearly value the opportunity to meet a wide range of scientists and engineers. I am sure the Exhibition will be returning again for its 4th visit next year".

Organiser Lisa Jones-Taylor from Nu-Tech Associates added, "The turn-out at Culham was good. We work closely with the host organisations and hold our events in locations convenient to the workforce. This accounts for the continued success of Culham as a venue and the addition of UKAEA Harwell as a venue this year. At both events visitors showed a particular interest in the exhibitors' products and services, this was reflected in the amount of time they spent at the exhibitions."

Lemo UK exhibited for the first time at this event. Sales Engineer, Neil Unitt told Fusion Business "Through Technology 2004 we have made over 15 new contacts by exhibiting at Culham and Harwell over the past two days. Site exhibitions are important to us because we get to

meet a wide spectrum of customers thus expanding our customer base and promoting our products to a wider audience."

## Technology Seminar Addresses Future Skills Requirements.

An additional attraction this year was the Culham Technology Exhibition Seminar, hosted by UKAEA. Open to both staff and exhibitors the seminar addressed the issues of meeting future skills requirements in science



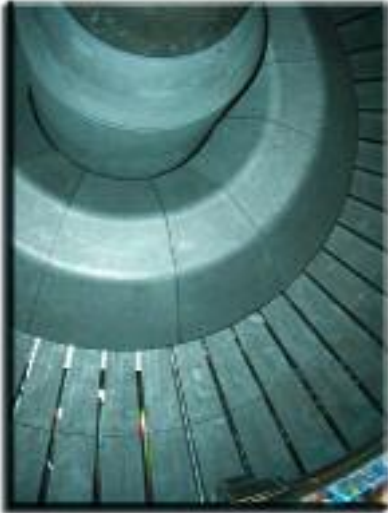
and technology in the UK. Culham's Director, Professor Sir Chris Llewellyn Smith chaired the seminar.

Guest speakers were Dr. Justin Goldberg, Technical Director of the Babtie Group who posed the question, "Who will engineer our future?", Bridget Holligan, Education Projects Manager from the Oxford Trust who discussed the Science and Engineering Ambassadors' Scheme and other ways of promoting science and engineering at an early stage in UK schools and Dr Wendy Kneissl, Senior Manager from the Institute of Physics who explored the problem of recruiting and retaining women in physics.

Following on from their presentations a panel comprising of the guest speakers, Prof Sir Chris Llewellyn Smith and Mike Brewin Technical Director of RWE NUKEM fielded a lively question and answer session which highlighted that retention and recruitment of young scientists and engineers is becoming a serious problem, particularly in the nuclear industry.

# MAST Back online

Work on upgrading the UKAEA's fusion research flagship, the Mega Amp Spherical Tokamak (MAST) has been completed, ahead of a higher power, longer pulse length experimental programme commencing in May.



*Part of the new MAST divertor*

In addition to upgrading the in-vessel armour with a new plasma-facing graphite divertor and adding a longer central solenoid, MAST now has a JET-style neutral beam injector heating system capable eventually of supplying 5MW of heating power for 5 seconds. Plasma diagnostics have also been improved to gather more detailed plasma information arising from the longer, higher power pulses.

During the MAST upgrade, four additional magnetic coils to address instabilities produced by errors in the magnetic fields used to contain the plasma were installed. "All tokamaks have very small field errors because the poloidal and toroidal magnetic fields are not totally symmetric; the plasma focuses on these errors, which can lead to plasma instability," explains Alan Sykes of MAST. "The four large coils outside the MAST vessel will allow us to compensate the field errors, enabling us to conduct experiments with higher performance plasmas."

## ITER Challenge for UK Industry

The Fusion & Industry team invites UK companies to visit the Fusion & Industry web site ([www.fusion.org.uk/industry](http://www.fusion.org.uk/industry)) to find out more about the technologies and skills needed to construct and operate ITER. If you believe your company can provide equipment and/or consultancy to the project, please contact [deniese.willis@ukaea.org.uk](mailto:deniese.willis@ukaea.org.uk) for an ITER supplier profile. Successful organisations will be added to the current suppliers list in readiness for when it is required by the ITER procurement team.

## Update on ITER

No decision has been reached on the final location of ITER. Negotiations between Japan and Europe, as to which country will host ITER, are continuing. We will provide more updates in the August edition of Fusion Business.

## Looking Forward to IFMIF

Fusion scientists at the Culham Science Centre are assisting in the development of an International Fusion Materials Irradiation Facility (IFMIF) by the European Union, Japan, Russia and the US.

The successful development of a fusion power plant rests to a large degree on the availability of materials capable of withstanding the high neutron and heat fluxes produced during fusion. The materials being considered for fusion energy systems encompass a broad range of metals and non-metals, however, much attention has necessarily focused on the structural materials for the blanket and first wall regions. The irradiation environment is particularly severe in these regions (10-15 MWy/m<sup>2</sup>) with at least 20 displacements per atom per full power year. Therefore the technological and economic success of fusion as an energy source is critically dependent on finding a suitable low-activation structural material.

IFMIF developments at the Culham Science Centre are being co-

ordinated by Dr Ian Cook, "The primary mission of the fusion irradiation facility will be to generate a materials irradiation database for the design, construction, licensing, and safe operation of a fusion power plant - Fusion Demonstration Reactor (DEMO). This will be achieved through testing and qualifying materials performance under neutron irradiation that simulates service up to the full lifetime anticipated for DEMO. Tests of blanket elements will be an important use of the facility, and will complement the tests of blanket test modules in the forthcoming International Tokamak Experimental Reactor (ITER)."

Technical documentation and IFMIF project news is maintained by the Japan Atomic Energy Research Institute (JAERI) on their website:

[http://insdell.tokai.jaeri.go.jp/IFMIFHOME/ifmif\\_home\\_e.html](http://insdell.tokai.jaeri.go.jp/IFMIFHOME/ifmif_home_e.html)

## New Look Fusion Website

The Fusion and Industry website is currently being overhauled. The whole site is being redesigned and updated. The new look website will be in line with other Fusion and Industry literature.

# Opportunity through active collaboration between UKAEA Culham and CCLRC – RAL

**“Exciting opportunities exist for active collaboration between UKAEA Culham and CCLRC at Rutherford Appleton Laboratory (RAL) from fusion and light sources to accelerators and space science. Separated only by a few miles, yet both Culham and RAL have so much in common” words echoed by Chris Llewellyn Smith Director of UKAEA Culham and Ken Peach Director of Particle Physics at RAL after their joint workshop in February 04.**

Around 70 staff including Chris Llewellyn Smith, Director of UKAEA Culham, Ken Peach, Director of Particle Physics at RAL, and Dan Mistry, UKAEA Fusion and Industry Manager, attended a joint ‘Technology Workshop’ in February 2004. The day-long event was divided into three broad subjects – plasmas, diagnostics and accelerators, sensors and detectors and RF, DAQ and controls – with presentations by both organizations on each topic and concluded with a discussion chaired by Ken Peach of CCLRC, and the exploration of the potential for joint working groups.

“The workshop was a very enjoyable and

positive affair and it was clear that there were many areas where there was much in common,” commented Ken Peach.

“A number of very useful contacts were made on both sides, and will be taken forward. We plan to hold more events of this kind and there are already requests for active participation in areas such as e-science, engineering, superconductivity, safety systems and of course, engagement of UK Industry in delivering our respective programme. While it is clear that the role and mission of the two organisations is different - Culham is very focused on fusion, CCLRC has a very diverse programme - the technological challenges are similar.”

## Plasmas and Diagnostics

UKAEA's William Morris chaired the afternoon session and gave a presentation on plasmas and diagnostics for the fusion team. He said, “From Culham's perspective we hope to play a substantial role in building plasma measurement and heating systems for the international fusion device ITER. Perhaps also in the design and construction of the accelerator-based International Fusion Materials Irradiation Facility (IFMIF) which tackles the key problem of material development and validation for fusion power plants. We will not be able to do these on our own. In the

shorter term there will be opportunities for detector and diagnostic development on existing fusion experiments such as MAST at Culham. This first exploratory meeting revealed just how much we can learn from each other, and I was very pleased with the wide range of experts who made time to attend. It showed me at first-hand the capabilities within CCLRC and the scale of the projects on the horizon. I am very optimistic that we can combine our skills to solve technical problems and prepare the UK for the challenges ahead in these specialist industries.”

## The Way Forward for UKAEA & RAL

“Our aim now is to develop a closer dialogue by the formation of specific discussion groups. Therefore, I am keen to start an Industry Forum” said Dan Mistry. The main aim of the Industry Forum will be to:

- Identify if there are any commonalities of work areas
- Share expertise and best practices
- Develop a collaborative framework to deliver future R&D programme
- Share experience of working with industry, especially UK industry.

“I am sure the Industry Forum will prove very beneficial to our respective organisations” commented Dan Mistry.

## BRIGHT IDEAS TO BENEFIT BUSINESS - FIRST RAINBOW INVESTMENT FOR CULHAM

**The Rainbow Seed Fund is a venture capital seedcorn fund established by the government to promote the commercialisation of public sector research in the UK. The Fund brings together five public sector research establishments (PSREs) who are able to share learning and work together to maximise the market opportunities presented by scientific research: the Council for the Central Laboratory of the Research Councils (CCLRC), the National Environment Research Council (NERC), the Defence, Science and Technology Laboratory (dstl), the Particle Physics and Astronomy Research Council (PPARC) and UKAEA Culham Science Centre.**

For scientists working at the cutting edge of technology, for whom creative thinking and problem-solving are fundamental skills, the generation of innovative ideas is second nature. It is the role of UKAEA's Technology Transfer Manager, Miriam Mason, to realise the commercial potential of such ideas with the support of Rainbow. To help her in this task Miriam has formed a team of nine Industry 'champions' within Culham Division who act as exploitation scouts within their respective areas of expertise (see February 2003 issue).

“The initiative is still in the early stages of development but already three Culham inventions, involving novel applications for holographic design technology and optical and electronic engineering skills, have been successful in securing a total of £25k of Rainbow funding, which will be used for patenting,



market research and further development of the ideas”, says Miriam Mason.

“This is a very promising start and I'm delighted that Andrew's and Julian's efforts have been recognised in this way. I'm sure it will encourage other scientists at Culham to consider the commercial potential of their ideas.”

**Watch this space for future updates on Rainbow successes...**



**Culham engineers with bright ideas: Andrew Borthwick (right) and Julian Hawes, both based in Culham's Heating & Fuelling Group**



# Culham Innovation Centre

## Culham Innovation Centre – Giving Innovation a Home

**Culham Innovation Centre has now been open for 3 years and during this time over 25 innovative companies have benefited from the many support services on offer. The Centre is part of a network of 11 Innovation Centres operated by Oxford Innovation, which currently support over 250 technology companies.**

Culham Innovation Centre gives businesses the best possible start so that they are in a strong position to survive and grow. There are

many services available to start-up companies, including the benefit of flexible premises and access to finance – helping them to bid for grants or raise finance through business angel investor networks. For new businesses who are not yet ready to move into offices, the Centre offers a low-cost virtual office facility (OxiFlex) which enables them use all the Centre's facilities and support services.

Barbara Allsworth, Centre Manager at Culham Innovation Centre, said, "The centre creates a very professional working environment for tenants and the Innovation Centre staff understand their business requirements. The flexibility offered by the Innovation Centre is particularly attractive – companies know that as they grow they can expand quickly into larger space within the Centre. The space is let on a simple licence agreement for a short

period, this avoids companies being tied into a long lease.

The Centre also provides an excellent range of office services, such as central reception, switchboard, meeting rooms, telecoms and broadband. This enables companies to concentrate on developing their businesses without worrying about the infrastructure. They also appreciate the regular networking events which allow them to share experience with the other companies and make business contacts."

**For information about Culham Innovation Centre please contact: Barbara Allsworth, Centre Manager, tel. (01865) 408300 or email [culham@oxin.co.uk](mailto:culham@oxin.co.uk)/culham.**

**Latest office availability can be viewed on our website at [www.oxin.co.uk/culham](http://www.oxin.co.uk/culham).**

## Growing a Technology Business

**Following on from the success of 'Starting a Technology Business', Oxford Innovation, along with The Institute of Electrical Engineers held 'Growing a Technology Business', at Cherwell Innovation Centre in February 2004.**

The event aimed at supporting early stage companies, included a series of short

presentations and case studies by local companies, such as Babbox and Tessella.

Joanne Willett, Director of Innovation Centre Marketing, said, "The event provided an overview of the issues growing companies can face, including advice on finance, marketing and sales techniques and example case studies. The series of events has proven to be a complete success with over 60 attendees at each event. We are

delighted with the feedback from these events and as a result plan to run them again in the future. The collaboration with the IEE works well since both organisations are working to support young technology companies."

**The 'Starting a Technology Business' event will be held again in March 2005 and people can pre-register interest at the Oxford Innovation website [www.oxin.co.uk/culham](http://www.oxin.co.uk/culham).**

## Toumaz Technology

**Low power chip specialist, Toumaz Technology, the first company to set up their business in the Culham Innovation Centre, has outgrown its offices at the Centre and will shortly be moving to the nearby Milton Park business park in Didcot. The office relocation follows a £1.5M investment by the Canadian Gennum Corporation and is just the latest development for a company that is leading the field in ultra low power electronic devices.**

Originally formed in 2000 as a spin-out from Imperial College, London, by Keith Errey and Prof. Chris Toumazou, a leading world expert in analogue semiconductor design, Toumaz will be collaborating with Gennum on the co-development of a leading-edge, ultra-low power, ultra-compact digital wireless platforms

suitable for many application such as hearing instruments, wireless headsets and healthcare, consumer and automotive markets.

"When we arrived at Culham in 2001, it was just myself and Chris Toumazou today we have 20 staff and continue to grow," says Keith Errey, CEO of Toumaz Technology. "The Culham Innovation Centre has provided an ideal starting point for our business in terms of location, facilities and support from Oxford Innovation. In moving to much larger premises at Milton Park, we're putting in place the office and IT infrastructure we'll need to cope with substantial business growth over the next couple of years."



## FUSION SUPPORT FOR UK SCIENCE PARKS - STRONG MESSAGE FOR INTERNATIONAL CONFERENCE

**Plans are underway at Culham Science Centre to encourage the development of a national technical support network for UK science parks, in collaboration with fellow members of the UK Science Parks Association (UKSPA).**

Culham is taking the lead in offering the opportunity of technical assistance to UKSPA's high-tech client companies and is currently carrying out a pilot exercise with a company based on Wolverhampton Science Park. The pilot will be used as a project case study to demonstrate how the scheme works in practice before rolling it out more widely.

UKAEA's Technology Transfer Manager, Miriam Mason, will be describing the scheme and her vision for the future at the International Association of Science Parks (IASP) World Conference

2004 in Italy in September. "As an UKSPA member Culham is well placed to make a unique contribution to the technological performance of science park-based companies," says Miriam. "I hope that businesses will exploit this valuable resource and that other science parks may be encouraged to follow our example."

**For more information on the conference and details of how to register, see [www.iaspbergamo2004.com](http://www.iaspbergamo2004.com).**



Views expressed in Fusion Business do not necessarily reflect those of the EURATOM/UKAEA Fusion Association. No liability is accepted whatsoever for errors or omissions in Fusion Business. This work is funded jointly by the United Kingdom Engineering and Physical Sciences Research Council (EPSRC) and by EURATOM.