pulse

03 09/15

PULSE offers an insight into Culham Science Centre (CSC)'s valued businesses, from harnessing the power of fusion, to finding a cure for cancer, it's all here for you to discover.

New furnace to help SABRE engine

The Reaction Engines (REL) team are celebrating the installation of a new £1.5 million state-of-the-art high vacuum furnace to assist in the development of their SABRE Engine Demonstrator Programme.

Jointly funded by REL's private capital and the European Space Agency, representatives from the UK Space Agency, Department of BIS and the European Space Agency recently visited REL's new pre-cooler manufacturing centre in Building E1 at Culham Science Centre.

The furnace is capable of achieving temperatures approaching 1200°C with a base pressure of one ten billionth of an atmosphere (10^{-10}atm) and will be employed for a series of complex braze trials.

Simon Hanks, Head of Advanced Manufacturing, REL, explains: "The furnace represents enabling technology that is virtually unique in the UK and has been designed by REL for the production of pre-cooler

module assemblies which form part of our heat exchanger technology for the SABRE Engine."

The furnace has an internal diameter of nearly 3m, and a total internal volume of 25m^3 providing REL with the means to build world-leading heat exchanger technology at Culham Science Centre.

Simon concludes: "With efforts underway to demonstrate the performance of the full SABRE engine cycle on a static test bed, the pre-cooler manufacturing capability will form a critical part of that undertaking."

reactionengines.co.uk

MAST update

Engineers from Culham Centre for Fusion Energy (CCFE) have received delivery of a two tonne, five metre-long, copper centre rod, one of the key components for the MAST (Mega Amp Spherical Tokamak) Upgrade.

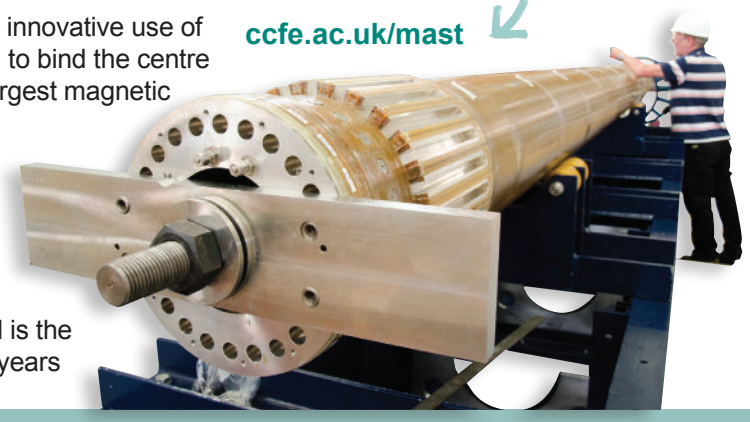
The centre rod is an integral part of forming the device's 'toroidal' magnetic field, which confines the hot plasma in its compact 'cored apple' shape.

Manufacturing the centre rod was a complex process, from the initial production of the copper wedges, to glass wrapping and vacuum impregnation of the entire assembly with resin.

Key to this was the innovative use of cyanate ester resin to bind the centre rod – the world's largest magnetic coil to do so.

MAST-Upgrade Project Leader Joe Milnes, said: "This is a major step forward in building the new MAST and is the culmination of two years of extensive design, research and development activities both on the Culham site and with a number of specialist UK and European suppliers."

ccfe.ac.uk/mast



Global Science Spaces

Eight delegates from the Leverhulme Trust International Network: 'Global Science Spaces: Dimensions of Transnationalism' recently visited Culham Science Centre (CSC) for briefings on the development of the site, fusion research and a tour of JET.

The network, hosted at Oxford Brookes University, includes seven partner institutions across the UK, US, Europe and Asia. It aims to develop understanding of the diversity and meaning of science spaces around the world by examining the influence of specific architectural styles, forms of science diplomacy, and international labour movements in creating these special types of places.

Research will be conducted across six international case studies including in the UK (Science Vale), Netherlands (Kennispark Twente), South Korea (Daedeok Innopolis), US (Silicon Valley), Taiwan (Hsinchu Science Park) and Singapore Science Park.

Principal Investigator for the network, Dr. Dave Valler, a Reader in the Department of Planning at Oxford Brookes, commented:

"Our research investigates how global labour markets and knowledge flows interact with patterns of international diplomacy and ideas about science, architecture and planning to create distinctive science landscapes around the world. Culham Science Centre is intrinsic to Oxfordshire's Science Vale and its distinctive history of world-leading fusion research and big science facilities give it a very particular character as an international science landscape".

The project will run until February 2017. Further information is available at: globalsciencespaces.org

Enterprise Europe Network Event

Culham Science Centre has teamed-up with Oxford Innovation Services to host a free event that will help budding entrepreneurs and SMEs to grow their business internationally.

Taking place on 29 September from 10.00am – 2.30pm in the Conference Centre, the event will include an overview of the European Enterprise Network outlining the following:

- How to identify and enter new international markets
- How to fund expansion plans
- Avoiding the deadly pitfalls to limit failure when applying for grants or raising funding
- Partnering/collaboration for business expansion

The event is free to attend and is sponsored by NATWEST who will provide information on funding for business expansion. There will also be an opportunity to network with attendees and partner organisations.

Find out more information by visiting culham.org.uk

Advanced Materials Spotlight

The Materials Research Facility (MRF) is due to open its doors at Culham Science Centre in December 2015 with plans already in progress to expand the new building.

Capturing the attention of companies such as Rolls Royce, AMEC and EDF Energy, universities from Oxford, Bristol, Sheffield, Manchester and London, and organisations including EUROfusion and the National Nuclear Laboratory (NNL), MRF is a powerful asset for Culham's continued development.

The new facility is part of the National Nuclear User Facility (NNUF), a government initiative bringing together three key organisations involved in materials R&D – Culham Centre for Fusion Energy (CCFE), the NNL and The University of Manchester (UoM). The initiative enables all three facilities to host materials research with varying levels of radiation damage.

In advance of MRF's opening, NNL has recently relocated its Materials, Chemistry and Modelling team from Harwell to Culham Science Centre to work more closely with scientists from CCFE, ideal timing to maximise synergies between the two organisations on MRF and other research.

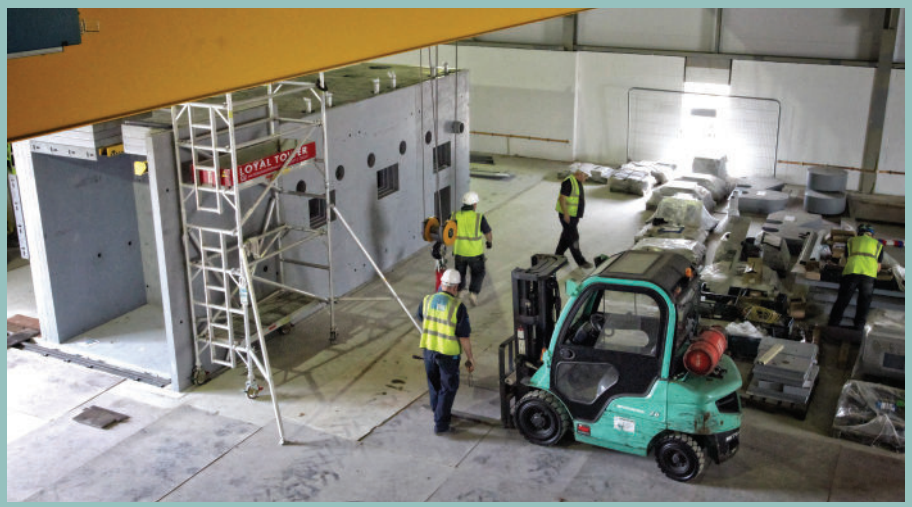
Dr. Fiona Rayment, Director of Fuel Cycle Solutions, NNL explains: "This is the start of an exciting journey bringing two internationally recognised and government endorsed laboratories together with the aim of sharing knowledge for the advancement of fusion and fission."

"The MRF will bridge the gap between the university or industrial laboratory and our own NNL facilities. For instance, work can be carried out on materials that have been subjected to high levels of radiation damage at our Sellafield site in Cumbria, whereas other materials can be examined at the MRF at Culham Science Centre."

The 2,200 sq. m. MRF building, costing a total of £9 million (£5 million from NNUF and the remainder from other UKAEA funds) will contain one receipt cell and three hot cells with room for more. The facility can accommodate up to eight instruments enabling the processing of active material and the ability to analyse the effect of neutron irradiation on advanced materials either on site or at industrial or university labs.

Martin O'Brien, project sponsor for the MRF, UKAEA, explains: "The MRF will benefit of from our long-standing nuclear expertise, and be able to take material up to an inventory of 4 TBq on a non-licensed site."

Some of MRF's equipment has already been purchased including a Dual beam Focussed Ion Beam, Nanoindenter and a Scanning Electron Microscope with EDS and EBSD Detectors, currently operational on the ground floor of D3 building.



Martin continues: “The new equipment has been a great asset for various external and internal projects involving several universities, JET and MAST, and two Culham Science Centre companies, Reaction Engines and Isis Instruments. The MRF will enable it to be used on much more radioactive samples.”

Martin and his UKAEA colleagues recently hosted a workshop to explain the benefits of MRF in addition to sounding out ideas about additional equipment that will be bought with future investment to ensure a joined-up way of thinking between industry (including SMEs) and academic needs.

He explains: “We know from our workshop with key industry players, universities and institutes, that demand is high for the use of MRF, which is why we are already putting together a bid for more funding to extend the building and more than double the scientific equipment and other facilities over the next four years.”

UKAEA is developing a proposal to try and access some of the £60million of funding awarded to NNUF by the Government for more nuclear research equipment, available to spend from 2017.

In addition, NNL is currently liaising with UKAEA, Oxford University Materials Department and other European organisations, to apply for a research grant from Europe’s Horizon 2020 programme to develop nanostructured steels for extreme environments. The consortium has already passed the first hurdle and is now creating a detailed proposal which if successful will secure in excess of €5 million.

Commenting on the future of MRF and working more closely with NNL, Martin concludes: “The NNL team is a great addition to the Culham community and co-location will help to strengthen our existing relationship. They have fantastic materials scientists and chemists who will add expertise to our own, working with us on MRF and other projects. We are all looking forward to an exciting future working together.”

ccfe.co.uk; nnl.co.uk; nnuf.ac.uk

50th Anniversary Exhibition

An exhibition celebrating Culham Laboratory’s 50th anniversary is taking place at Abingdon County Hall Museum until 14 October 2015.

Exhibits include a number of artefacts and science equipment along with fascinating personal accounts of experiments, some of which gives a fascinating glimpse of social history during the height of the Cold War.

Chris Warrick, UKAEA Communications Group Manager, said: “The exhibition is free to visit and will be interesting to anyone who would like to learn more about the site’s heritage and JET in addition to taking a glimpse into the future to see what the next 50 years holds.”

Abingdon Museum is open from 10.00 – 16.00 Tuesday – Sunday and the exhibition is free to attend.

Happy 10th Birthday

Architectural firm, LAPD, is celebrating their 10th year in business with an office move from Building C2 to F5 that will future proof anticipated business growth.

"Culham Science Centre has a great campus feel and we benefit from being part of a thriving environment with a range of different companies on site," comments LAPD Director, Opinder Liddar.

LAPD's 12 strong team work across residential and commercial developments valued from £30,000 to £2 million, and have won a number of awards for recognition of their innovative and sustainable designs.

Opinder explains: "We very much design for living and strongly believe sustainability and innovation should be included in all of our designs. It's extremely important to get the envelope right before considering gadgets."

LAPD strive to reduce water usage through rainwater harvesting and always consider alternative methods to heat a building such as heat pump systems. Recent projects have also involved the installation of an Archimedes Screw used for hydropower at sites across the Vale of White Horse.

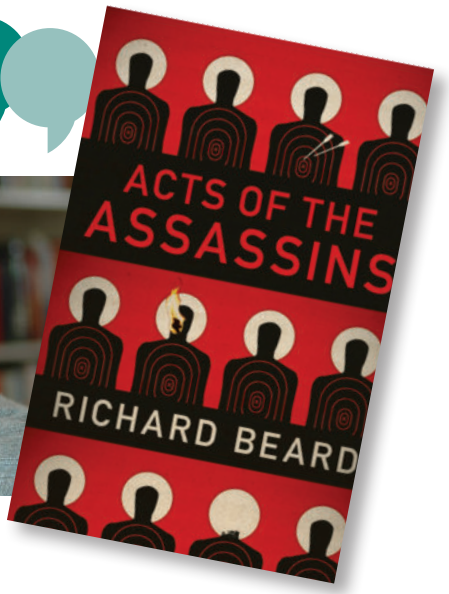
CSC would like to wish LAPD a happy 10th birthday!
lapdarchitects.co.uk

Who's Who

Culham's Assassin.

Richard Beard is the author of six novels, Director of the National Academy for Writing and has been a tenant of Culham Science Centre since 2011.

Commenting on his new book, Acts of the Assassins, Richard said: "The book was written in Building C2 and Culham Science Centre has definitely been influential as there is far more science in the book than expected."



"Past and present combine to startling effect in this challenging novel…Beard is a radical and inventive novelist…" **The Guardian**

Richard continues: "Writing is already in progress for my next book, which even contains particle physics!"

richardbeard.info

Outstanding Nursery Expands

A new preschool building has recently opened at Culham Science Centre's (CSC) Nursery and Preschool providing 40 additional places to accommodate growing demand as CSC continues to expand.

Nursery Manager, Nikki Smith has provided excellent leadership to her team over the last nine years, which has seen the nursery rated as 'Outstanding' by Ofsted.

Commenting on the new building, Nikki said: "It has been designed by award winning architects who specialise in early years and environmentally friendly design. Inspired by our surrounds, we embrace the whole forest school approach here and our children are exposed to a natural outdoor environment for as much of the day as possible. We are really excited for all our preschoolers who have moved to the new building and they are pretty excited about it too!"

For enquiries about the Culham Science Centre Nursery and Preschool please call Nikki on 01865 408128 or email info@culhamnursery.co.uk

Did You Know?

Reaction Engines' SABRE is a rocket engine designed to power vehicles directly into space, but in a different configuration, it will allow aircraft to cruise at five times the speed of sound within the atmosphere.

Events

Culham's 50th Anniversary Exhibition
Abingdon County Hall Museum, until 18 October 2015

EEN Event Culham Conference Centre 29 September 2015, see pg. 2.

Energy Seminar Talks, 14.00, HOW Lecture Theatre, K1. No booking required:

- **Anupama Sen** (Oxford Institute for Energy Studies) 8 October 2015
- **David Howey** (Department of Engineering Science, Univ. of Oxford) 12 November 2015
- **Peter Edwards** (Inorganic Chemistry Laboratory, Univ. of Oxford) 10 December 2015

Jobs

LAPD
Lead Architect

We are looking for a qualified lead architect with strong technical and client liaison skills with UK experience to work across residential projects.

Please email a cover letter and CV to enquiry@lapdarchitects.co.uk

Services

Dry Cleaning
Culham's dry cleaning service is provided by Johnsons with exclusive bundle deals now available.
Visit the E2 Shop for details.

Do you have a story?

If you have a story you want featured in PULSE
E: anne.tingley@ccfe.ac.uk