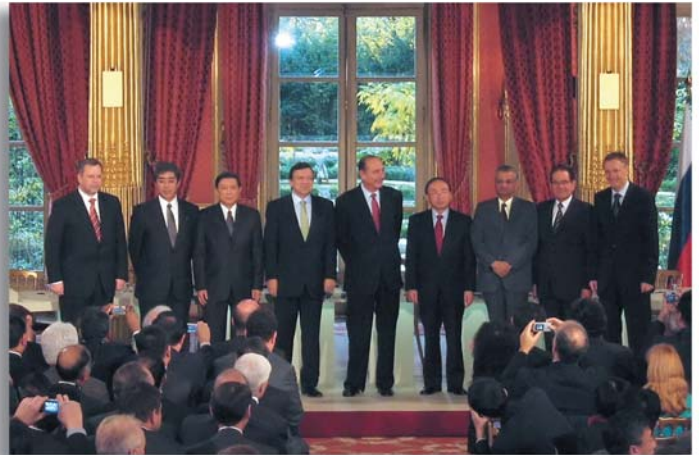


## ITER Formal Signing takes place in Paris

**O**n 21st November the ITER International Consortium signed a formal agreement to build the experimental nuclear fusion reactor, ITER at Cadarache in France. The signing took place at the Elysée Palace in Paris and was hosted by the President of France, Jacques Chirac, and the President of the European Commission, José Manuel Durão Barroso (see photo). The ITER Organisation now has the capacity to directly hire staff and to start preparing procurement documents. The first posts may be viewed at <http://www.iter.org/a/jobs.htm>



**“The ITER organisation can now embark on its mission to help create a new source of energy for humankind.”**

Kaname Ikeda, ITER DG Nominee

## UK Company wins ITER Control Systems Contract

Micromech Systems Ltd, a system build and automation specialist, has been awarded a contract worth £150,000 to supply the control systems for a prototype remote handling device needed to insert and remove divertor cassettes from the ITER vacuum vessel

Micromech is working as a sub-contractor to a Spanish fabrication company TTM which is building the Cassette Multifunctional Mover (CMM) remote handling arm. Controlling the arm is not a trivial exercise. “It weighs around 8 tonnes and is used to position the cassette on a track within the port plug and then move it forward to line up locking pins, all within an accuracy of  $\pm 3.5\text{mm}$ ,” said Stirling Morley, Sales Director of Micromech Ltd. The ITER environment poses some interesting technical challenges for Micromech. Aside from the size of the arm and cables which have to be radiation tolerant, the control system uses deionised water hydraulics which require bespoke valves to

counter the lack of lubrication. The CMM prototype will ultimately be tested in Finland with a full size divertor cassette.

EFDA first alerted UKAEA to this project and Dan Mistry, UKAEA's Fusion & Industry Manager nominated a number of UK companies for the contract covering the detailed design and manufacture of the CMM used to install and remove divertor cassettes. Although the project went to TTM, Micromech was able to fulfil an important sub-contract role.

**For more information about Micromech Systems please visit [www.micromech.co.uk](http://www.micromech.co.uk).**

### STOP PRESS - BUSINESS SUCCESS FOR UK COMPANIES

**The final contracts for the major enhancements of JET, to be installed in 2008/9, have now almost all been placed. Many have been won by UK companies and we will be featuring some of these in future issues**

### Inside This Issue:

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# NEW LARGE RESEARCH FACILITIES INITIATIVE IS LAUNCHED AT RAL

**The new Research Facilities group of the Sensors Knowledge Transfer Network (KTN) was launched at CCLRC's Rutherford Appleton Laboratory (RAL) in Oxfordshire on 11 September.**

Some 250 delegates, including 180 from industry, heard first-hand about 'doing business with research facilities' from CCLRC Chief Executive, John Wood and other key speakers. Delegates were then given the opportunity to tour facilities at RAL and attend sessions to hear about CERN, the European Space Agency, Fusion (JET, MAST and ITER), the Diamond Light Source and the

Central Laser Facility (both at RAL) and the European Southern Observatory's proposed Extremely Large Telescope.

The new Research Facilities group has been formed specifically to give industry access to this research market. The annual supply of goods and services alone to European research facilities is worth in the region of €5 billion, and worldwide it is more like €20 billion. "This 'joined-up' approach brings huge potential benefits for the UK economy; the UKAEA Fusion & Industry programme is delighted to be part of this initiative" said Martin O'Brien, UKAEA Fusion Programme Manager.

## Services on offer from the KTN include:

- a **Research Facilities Opportunities Bulletin**
  - **support for individual businesses**
  - **a forthcoming Events Programme.**

**A new research facilities database will help to support and develop supply chains between industry and research facilities and hold details of companies and the products they supply. Companies are encouraged to register for the new KTN database at [www.qi3.co.uk/sktn](http://www.qi3.co.uk/sktn). This database will complement not replace the fusion-specific databases which companies can register on at [www.fusion.org.uk/industry](http://www.fusion.org.uk/industry) and [www.efda.org/eidi](http://www.efda.org/eidi)**

## 'Engineers Profile'

## Introducing Fusion Engineers to UK plc

### Lawrence Jones - Mechanical Engineer

Lawrence Jones is a Chartered Mechanical Engineer with a Degree and Masters in Engineering Science from Cambridge University. He has 33 years of scientific, engineering and project management experience, including 15 years working on JET at Culham Science Centre. With a strong theoretical and analytical base, a flair for design, sound management and negotiating ability Lawrence has considerable experience in supervising large technical contracts and liaising with international colleagues, contractors and clients.

For the past 9 years he has been working at EFDA, Garching in Germany with responsibility for Research & Development for the ITER vacuum vessel which has uniquely positioned him to occupy a key role in the successful manufacture of the vessel, either at ITER or at the European Domestic Agency to be set up in Barcelona. In this post he has been involved with the critical task of negotiations with the Korean, Russian and European Industry and Home Teams in order to resolve the open issue of the sharing of the ITER VV Sector Procurement.

In his early career he worked as a Project Engineer in the Remote Handling Group at JET at Culham Science Centre with sole responsibility for all mechanical engineering aspects of the JET suite of large remote handling equipment and held a Senior Engineer post in the RFX fusion project at Culham (later built in Italy) where his responsibilities included the design, analysis, procurement and fatigue testing of the prototype poloidal and toroidal field coil sets and transformer.

Lawrence is a member of the Institution of Mechanical Engineers and has published many papers on JET and the ITER Vacuum Vessel.



**Watch out for more Engineers' Profiles in future issues**

# CIC Companies Continue to Benefit from UKAEA's Technical Support Package



The UKAEA Technical Support Package (TSP) continues to assist start-up companies in the Culham Innovation Centre. Through a combination of technical know-how and practical engineering, the UKAEA is successfully transferring fusion technology and expertise to the UK businesses.

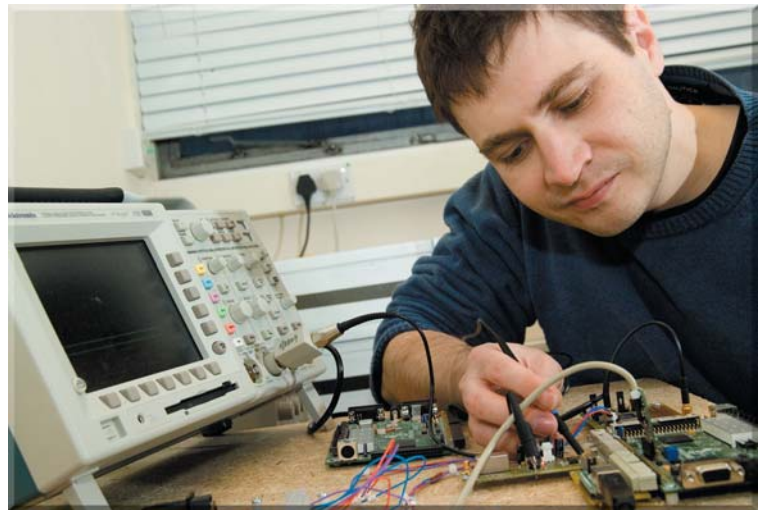
## AMR

## Prototyping Nuclear Magnetic Resonance with UKAEA's TSP

Advanced Magnetics Resonance Ltd (AMR) is the newest company to take advantage of UKAEA's TSP. Founded by Dr Tim Benson, AMR is developing a low-cost nuclear magnetic resonance (NMR) machine with the help of a Government grant, as well as providing service support for NMR machines in academic institutions and industry.

"A competitively-priced NMR machine holds out the prospect of creating new opportunities for the imaging technology in product quality control, analytical techniques and on-line testing," said Tim Benson. "The TSP will be used to assist with the prototyping NMR designs where a high degree of interaction is needed with the engineers fabricating components. One of the attractions of moving into the Culham Innovation Centre was the opportunity to tap into the wealth of experience and knowledge of fusion engineers who are literally just down the corridor."

For more information e-mail:  
[tbb@admagres.com](mailto:tbb@admagres.com)



## Reaction Engines

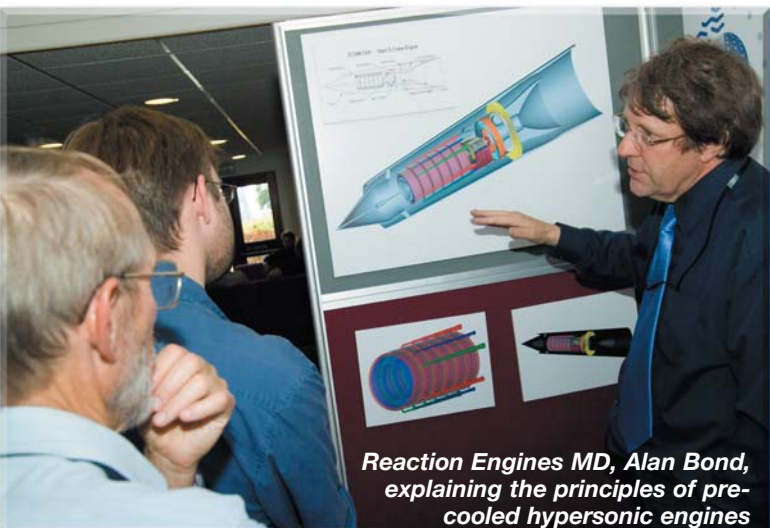
## Turning up the Heat with UKAEA's TSP

At Reaction Engines, a heat exchanger developer, the UKAEA Technical Support Package has been used in developing a prototype pre-cooler for a Single Stage to Orbit (SSTO) vehicle capable of achieving speeds between Mach 3 and Mach 5 allowing the vehicle to break free of the Earth's gravitational field.

Based on a 20 year technology study of HOTOL and SKYLON space planes, Reaction Engines has shown that heavily pre-cooled air-breathing engines combined with rocket mode operation for the latter ascent stage is capable of achieving earth orbit. Successfully developing an air-breathing engine is dependent on the performance of the heat exchangers that cool the incoming air. "Our objective is to cool hot gas from 1,000 °C to - 100 °C in the pre-cooler prior to compression. By understanding the flow of hot gas through the pre-cooler matrix we are able to adjust the matrix pattern and maximise heat transfer from gas to coolant," said Reaction Engines Propulsion Engineer Helen Webber.

In its latest use of UKAEA's TSP, to visualise the flow path of gas through the tube matrix, Reaction Engines has used a high-speed camera operating at 1,800 frames per second which is normally deployed by UKAEA fusion scientists on MAST to record the formation of plasma during fusion. The camera images have allowed Reaction Engines to capture the cross counter flow across the matrix and identify any problem areas.

For more information visit [www.reactionengines.co.uk](http://www.reactionengines.co.uk)



Reaction Engines MD, Alan Bond, explaining the principles of pre-cooled hypersonic engines

## Laplacian

## Developing a luggable MRI scanner using UKAEA's TSP

Magnetic Resonance Imaging (MRI) is no longer confined to medical applications. Innovations by MRI company Laplacian in the areas of gradient winding, manufacture and complex fabrication techniques continue to create new applications.

Drawing on the Technical Support Package, Peter Aptaker Managing Director of Laplacian, has developed a new luggable MRI scanner for sampling objects in excess of 150 mm diameter (see photo). As Peter Aptaker explained, "It's invaluable to have an opportunity to talk through ideas with UKAEA engineers and use their machine workshop for the more difficult machining projects. Our experience with the technical support package shows practical skills complemented by a solid theoretical background are important to achieving success in this field."

For more information visit [www.laplacian.co.uk](http://www.laplacian.co.uk)



## Oxis Energy

## Fully charged thanks to UKAEA's TSP

Oxis Energy has grown significantly over the past 12 months, expanding its research into rechargeable Lithium-Sulphide battery chemistry. Now employing seven people, the company is involved in applications including electric vehicle and back-up batteries for fibre optic networks. Lithium-Sulphide (Li-S) batteries perform well at temperatures above 60°C and are able to take a permanent overcharge connected to a charger without a protection circuit. This opens up applications in hazardous environments such as the oil and gas industry.

Over the past 12 months Oxis Energy has worked with the UKAEA's Special Techniques Group (STG) on new development and test equipment. "The ability to sit down and discuss an idea 'on the back of an envelope' with STG which they are then able to design and build is a huge benefit of the technical support package," says Gleb Ivanov, Managing Director of Oxis Energy.

For more information visit [www.oxisenergy.com](http://www.oxisenergy.com)

## Fusion and Industry Exhibits at Photonex 2006

**To increase awareness of the role of photonics in fusion research, members of the Fusion and Industry team attended the UK's specialist Photonics Exhibition and Optical Technologies Event, Photonex at Coventry in October.**

Fusion scientists use a wide range of photonic techniques for measurements required for control of the plasma on both MAST and JET. About 40 diagnostic systems will be used on ITER to provide input to plasma control systems and for evaluation and analysis of plasma performance. The EU is providing a number of these diagnostic systems.

At the exhibition, UKAEA explained that it expects to have a lead role in the development of the LIDAR Thomson Scattering system looking at the core of the

ITER plasma. The LIDAR will measure the temperature and density of the very hot plasma (in excess of 150 million °C) needed for fusion. The LIDAR diagnostic development project includes the design of the laser and collection optics, coordination of diagnostic integration in the port plug and other port structures, lasers, mirrors and detectors and coordination of performance analysis.

Deniese Willis, Events Manager, Fusion and Industry, said, "UKAEA is a member of the photonics cluster. Our presence at the show was invaluable in drawing attention to business opportunities for photonics companies."

**Companies interested in knowing more about the LIDAR project should contact Dan Mistry, Fusion and Industry Manager at [dan.mistry@ukaea.org.uk](mailto:dan.mistry@ukaea.org.uk).**



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