

TECHNICAL SUPPORT PACKAGE FOR TECHNOLOGY-BASED BUSINESSES

EXAMPLES OF TECHNICAL SUPPORT PACKAGE USERS

1. Introduction

Start-up technology companies at the Culham Innovation Centre are able to draw on the skills of the CCFE team working on one of the world's greatest engineering challenges to assist their business. Working in collaboration with Oxford Innovation Limited, CCFE is inviting suitably qualified, start-up businesses to apply for the Technical Support Package comprising skills consultancy and other technology assistance from fusion research.

2. Technical Support Package (TSP)

CCFE is currently providing a number of business incubators managed by Oxford Innovation (www.oxin.co.uk) with the TSP. Oxford Innovation aims to assist small and medium sized businesses (SMEs) in the widest possible way – ranging from provision of managed office space to procurement of services and in-house networking.

The Fusion & Industry initiative offers a technical support package for suitably qualified Culham Innovation Centre companies. Depending on their needs, this could include technical advice and access to mechanical, electrical and electronic engineering skills and technologies.

The Technical Support Package (TSP) is already assisting several start-up companies in the Culham Innovation Centre. (Examples of case studies overleaf).

3. Is the Technical Support Package for you?

The TSP is designed to provide you with access to skills and technologies that will make a tangible difference to your product /service development. To make best use of the package, and enable us to effectively manage our commitment to you, your company will need to tell us how you think we can best be of assistance to you.



4. World class skills and technologies

CCFE at its Culham Science Centre is a world leader in fusion research. Culham is the home of the UK's own fusion programme centred on the Mega Amp Spherical Tokamak (MAST) experiment and also hosts Europe's Joint European Torus (JET) which it operates on behalf of its partners.

Ahead of the development of a commercial fusion power plant, however, UK companies are already benefiting from the technology used in the fusion research programme. Through CCFE's technology transfer initiative, fusion research skills and technologies are being used in many industries in non-fusion markets.

In addition to precision engineering, the technologies used in fusion research include:

- Microwave systems
- Cryogenic systems
- Vacuum systems
- Plasma technology and diagnostics
- Gas injection
- Electromagnet design
- Control systems, signal processing, computing and data acquisition
- Particle beams
- Computing
- Innovative bonding techniques.

The application of fusion knowledge, technology and engineering skills has been widely used to help companies both avoid and, where necessary, overcome technical problems.

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Reaction Engines Wins Euro 1 million contract with ESA

Reaction Engines Ltd (REL) has been awarded a Euro 1 million contract by the European Space Agency (ESA) to demonstrate the core technologies for the SABRE air-breathing rocket engine that will eventually power the SKYLON spaceplane. The company will build on its knowledge acquired through CCFE's technical support package to develop the engine's pre-cooler.

SKYLON is a reusable spaceplane that can take off from a conventional aircraft runway, carry over twelve tonnes to orbit and then return to land on the same runway.

The two and half year demonstration programme has the objective of removing all the outstanding technical concerns on the SABRE engine.

The SABRE is a hybrid engine that can "breathe" air when in the atmosphere, like a jet engine, and become a rocket engine when in space. In air-breathing mode, air is first cooled by a revolutionary heat exchanger pre-cooler before being compressed and fed to the rocket engine to be burned with hydrogen fuel. When in rocket mode, the hydrogen is burnt with liquid oxygen.

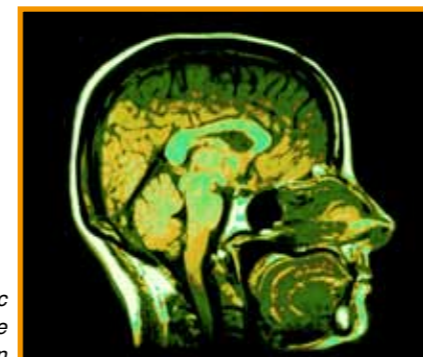
"Over the years the Technical Support Package has allowed us to build up considerable expertise within REL on brazing and tube manipulation techniques. It is still an important part of our development work. Recently we've used it to assist us with wind tunnel diagnostics, data acquisition and, all being well, it will enable us to overcome any technical problems we may encounter as we scale up and test the pre-cooler during the course of the demonstration programme," said Alan Bond, Managing Director, Reaction Engines.



SABRE engine model

JG09.385

Magnetic resonance imaging scan



Laplacian Gets to the Root of the Problem

Magnet resonance imaging specialist, Laplacian Ltd, has developed a movable scanner for conducting resonance imaging of tree trunks subjected to drought and deluge conditions, as part of a tree physiology project at the University of Surrey. Developed with the assistance of CCFE's technical support package (TSP), the scanner can be used on tree trunks up to 200 mm diameter and provides complete imaging of the trunk.

According to Peter Aptaker, Managing Director of Laplacian, the balancing of the customer's imaging requirement and portability posed many huge challenges. The tree scanner is the first of its kind where carbon fibre composites are being used to hold the magnets in place, rather than heavier steel plates, in an effort to keep the scanner's weight to under 55 kg.

The MRI scanner comprises two arms which "hug" the tree, each containing a unique array of magnet pieces and gradient windings. Laplacian has used the TSP to tap into the skills of the CCFE's Special Techniques Group for manufacture of the magnetic gradient windings and the final machining of the MRI unit.

"It is rare to find in one place the combination of engineering expertise and technical skills we are able to access in CCFE's Special Techniques Group," said Peter Aptaker.



Final magnet ready for lab test

Testing times for NMR Machines

Characterising the quality of the magnetic field of a NMR (nuclear magnetic resonance) machine, and related Magnetic Resonance Imaging, is a complex and often expensive process. Not for much longer, however, if the NMR test equipment being developed by AMR Ltd, with the assistance of CCFE's technical support package, is successful.

An important part of AMR's business is providing consultancy to food companies, and the offshore and petrochemical industries, where the quality and stability of the magnetic field is critical to clear imaging of samples. "If companies are to make the most of using NMR analysis techniques, there is a need for test equipment that is more accurate than existing methods, yet cost-effective and simpler to operate," said Tim Benson, Managing Director of AMR.

Tim has used the technical support package to assist in the fabrication of the spectrometer case and probes. "It's good to work with CCFE engineers who understand what you are trying to achieve and feel able to suggest improvements," Tim said.