

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 Test Facility

UKAEA and General Fusion have announced an agreement under which General Fusion aim to build and operate its Fusion Demonstration Plant (FDP) here at Culham Science Centre.

The FDP will demonstrate General Fusion's proprietary Magnetized Target Fusion (MTF) technology, paving the way for the company's subsequent commercial pilot plant.

General Fusion will benefit from the cluster of fusion supply chain activities in the UK, centred on UKAEA's globally recognised expertise and presence in the field. This is also an exciting and very positive development for UKAEA and the Culham site as a leading location for the nascent 'UK fusion cluster'.

The announcement was made by Amanda Solloway MP, Science Minister for the UK Government, who said: "This new plant by General Fusion is a huge boost for our plans to develop a fusion industry in the UK, and I'm thrilled that Culham will be home to such a cutting-edge and potentially transformative project. Fusion energy has great potential as a source of limitless, low-carbon energy, and today's announcement



is a clear vote of confidence in the region and the UK's status as a global science superpower."

Construction aims to start in 2022 followed by operations beginning approximately three years later.

Tim Bestwick, Chief Technology Officer and Director of Strategy, Communication and Business Development, UKAEA, added: "Culham has fantastic heritage and continues to be known for its world

leading fusion programmes, but we are now extending that to create a fusion technology cluster. This is by no means limited to companies that work in fusion, but is more applicable to those who are using what may have originated as a fusion technology, for alternative applications."

To enquire about joining the Fusion Technology Cluster contact:
dawn.russell@UKAEA.uk

Game Changing Science

Scientists at Culham Science Centre have successfully tested a world-first concept that could clear one of the major hurdles in developing fusion energy.

UKAEA announced results at an official opening of the MAST Upgrade facility, where guest of honour, British astronaut Tim Peake, created his own artificial 'star' by running a plasma test on the machine.

Initial results from the MAST Upgrade experiment have demonstrated the effectiveness of an innovative exhaust system designed to make compact fusion power plants commercially viable.

With no greenhouse gas emissions and abundant fuels, fusion can be a safe and sustainable part of the world's future energy supply.

ccfe.ukaea.uk



British astronaut Tim Peake



Cancer Screening

GeneFirst and University of Leeds have won a £1.4M grant to clinically validate the use of a novel NGS based technology in bowel cancer screening.

As the recipient of the highly competitive Invention for Innovation (i4i) funding from the National Institute of Health (NIHR), the aim of the 36-month project is to determine whether a sequencing-based assay for bowel cancer would be suited for the implementation into clinical use.

Bowel cancer occurrence is frequent, with 1.85 million cases annually worldwide. It is the second deadliest UK cancer, killing 16,571 patients annually and 850,000 worldwide. Five-year survival ranges from greater than 90% if diagnosed early to less than 10% at advanced stages.



Testing of released tumour DNA extracted from bodily substances, such as blood or faeces, can potentially reduce the number of colonoscopies performed and cancers missed. Current market solutions either struggle to detect early-stage cancer and precancerous lesions or have limitations for use in screening and patient stratifications.

Chief Operations Officer, Dr Winnie Wu, said, “We are immensely proud to have been recognised by the NIHR and we could not have found a better partner in Professor Quirke and his team to collaborate together

and address this vital healthcare challenge. We believe that ATOM-Seq can make a significant impact in bowel cancer diagnosis and complement existing state-of-the-art technology to improve the overall patient experience in screening for this disease.”

Following a recommendation from the UK National Screening Committee and a successful campaign from Bowel Cancer UK, the screening age of men and women for bowel cancer has been lowered from 60 and 74 to 50 in the UK.

[genefirst.com](https://www.genefirst.com) ←

Funding Success

Sense Biodetection (Sense) has raised a \$50m Series B investment to advance commercialisation of its Veros™ COVID-19 product and continue development of a portfolio of instrument-free, rapid molecular tests that enable improved access, outcomes, and value through patient-focused decentralised healthcare.

The Veros™ platform introduces novel and proprietary rapid molecular amplification technology to detect a variety of deadly and costly diseases. The Series B round was led by Koch DisruptiveTechnologies (KDT), a subsidiary of Koch Industries Inc.

Harry Lamble, CEO of Sense, said: “This Series B round is crucial in providing us with the resources to grow our Veros platform to revolutionize decentralized

point-of-care testing; and it is particularly important as we commercialize our Veros COVID-19 test, which delivers laboratory quality results directly to users within minutes, without an instrument. This will be an essential tool in the effective management of outbreaks of this and other diseases.”

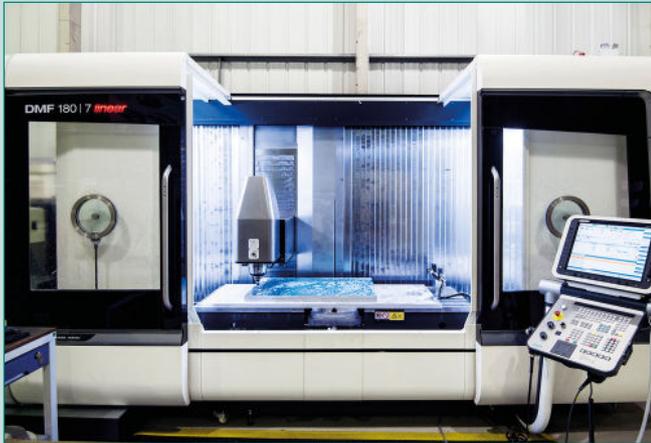
Sense’s Veros product platform ushers in a pioneering new class of molecular diagnostic test that brings the performance of central laboratory PCR testing into a rapid, easy-to-use, disposable format. Unconstrained by an instrument or reader, Veros products can be used beyond traditional healthcare settings, enabling better access, outcomes, and value for patients and providers.

[sense-bio.com](https://www.sense-bio.com) ←



Here to Help

Did you know you have access to some of the world's most innovative, cutting edge technology and advanced manufacturing capabilities right here on your doorstep?



Reaction Engines has relocated its manufacturing capability from Didcot to Culham Science Centre (CSC) and is offering all on site businesses the opportunity to benefit from its wealth of expertise, including precision machining and vacuum brazing to high specifications.

Chris O'Brien – Operations Manager Machining, Reaction Engines said: "Businesses at Culham can quickly tap into our extensive experience for any precision engineering project. With a track record of supporting internal and external customers with demanding projects, we can work side-by-side to tackle any

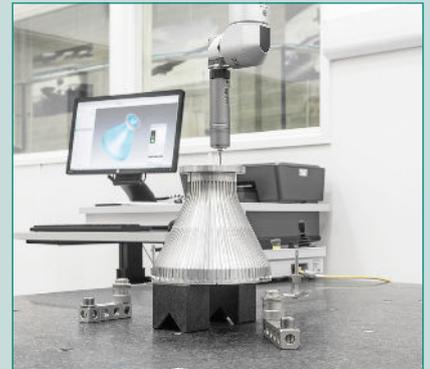
manufacturing challenges and look forward to helping you drive your business forward."

What Reaction Engines can do:

- Develop and manufacture bespoke prototypes
- Provide low-volume serial production
- Complex and clean room assembly work
- Tight tolerance work
- Custom vacuum brazing
- High precision 3 & 5 axis machining and wire erosion
- Precision assembly

- High precision metrology lab
- Testing and validation

For further information, email: enquiries@reactionengines.co.uk
reactionengines.co.uk



Nuclear Robotics

The UK Atomic Energy Authority ("UKAEA") has awarded Veolia Nuclear Solutions (UK) and Wälischmiller Engineering GmbH separate contracts totalling £3 million to supply robotic manipulator arms to its RACE research facility.

The £3M contract stems from the £12M UK-Japanese robotics deal for fusion energy and nuclear decommissioning research, called "LongOps", announced in January this year.

LongOps is a four-year collaboration led by RACE at Culham Science Centre and will support the delivery of faster and safer decommissioning at the

Tokyo Electric Power Company's ("TEPCO") Fukushima Dai-ichi site in Japan and at Sellafield in the UK.

Veolia Nuclear Solutions (UK) and Wälischmiller Engineering GmbH will each provide a twin-arm haptic manipulator – a form of kinaesthetic communications technology, complete with electrical and control systems, to deliver key aspects of the LongOps project.

The manipulators will also be used by UKAEA to train operators that are based at both Sellafield and Fukushima.

In addition, developments from LongOps will be applied to the upgrading, maintenance and dismantling of fusion devices, such as the Joint European Torus ("JET").

race.ukaea.uk 



Family Helps Amputees

An established leader in the development and innovation of prosthetic knees for leg amputees, Orthomobility is poised to launch a new product this year that will improve the lives of thousands of child amputees worldwide.

Based at Culham Science Centre since 2016, the company is already renowned for its propriety fluidic knee product range called the Very Good Knee or VGK, which provides amputees with more intuitive control of the knee.

Developing the VGK range for children is the brainchild of Jay Boender (24), the daughter of company founders, Jacob and Jennifer Boender. The business has become a family affair having also employed Jona Boender (23). The siblings are well placed to help drive the company forward with Jona holding a Masters in Engineering Science from the University of Oxford and Jay has a Masters in Biomedical Engineering from Imperial College London.

Jay comments: "The idea for a prosthetic knee for child amputees was actually first discussed at a family meal! We have since developed a successful prototype and have been carrying out feasibility and structural tests in addition to ensuring compliance with medical device regulations.

"By using our fluidic technology, the product currently known as 'our baby' will allow children aged 7 – 15 years to keep up with their peers, to play and explore and will significantly improve their social and physical independence, as well as enabling the NHS to address a clinical need."

Orthomobility's fluidic technology is revolutionary compared to other external lower leg prosthetic limbs, and in February 2020, was awarded its own classification by the Global Medical Devices Nomenclature (GMDN). Historically, prosthetic limbs have only been mechanical or mechatronic (electric), but the GMDN now has a new term:

"Fluidic External Knee Prosthesis –



Jona and Jay Boender of Orthomobility

A device which is a component of an external lower limb prosthesis designed to functionally replace, in part or total, an absent knee, wherein the principle of operation for motion control is based on hydraulic actuation regulated by a motion-feedback fluidics circuit (using vortex and/or pressure-compensating valves).

"It responds to changes in motion in real-time by continuously sensing knee flexion speed and instantly adjusting motion resistance within a single step. It may have various designs and functional features (e.g., lightweight for short stump use, stumble recovery) for support during a variety of activities."

In conventional prosthetic knees, temperature variations can cause changes in the behaviour of the knee joint, but the adaptive fluidic control developed by Orthomobility, makes it possible to have the resistance to knee flexion virtually independent from operating temperatures and weight placed on the prosthesis.

Amputees supported by Orthomobility include Charles, a 54-year-old husband and father of four daughters. He said:

"I have been missing a leg due to bone cancer since I was 23 years

old. I have first hand experience with many prosthetic knees, including some of the most advanced and most highly proclaimed in the marketplace.

Even though my amputation left me with a short transfemoral residual limb, I do not regard myself as a disabled person. The VGK-S is by far the best and most versatile knee I have ever had. It combines state-of-the-art functionality and security with robustness, and a feeling of extreme lightness in my mobility. I am able-bodied. I can do anything I want!"

Happy Anniversary

Orthomobility celebrates its 10th Anniversary this year and there is a sense the company has a lot to be proud of having made a significant difference to the lives of thousands during that time.

For Jay, she is excited to be working with her family and passionate about helping child amputees through the launch of the company's new product later this year. However, she didn't always envisage joining the family business:

"I originally wanted to study politics and economics as I wanted to help people, but thanks to a truly inspirational maths teacher, Mrs Wood, who is the Principal of the Europa School today, I explored the option of studying engineering.

"I would like to encourage more women to pursue a career in biomedical and mechanical engineering. I'm fortunate that Imperial encouraged diversity and I experienced a lot of support, but I think it is important for more women to be in STEM roles to create a more dynamic sector that drives forward innovation."

For further information about Orthomobility, visit: [Orthomobility.com](https://www.orthomobility.com)



Funding Available

Oxfordshire Advanced Skills (OAS) and MTC are calling for engineering businesses to consider the option of employing an apprentice from September 2021 and beyond, with funding now available to the tune of £8,200 per apprentice for every employer.

Through Government incentives and a partnership with Lloyds Bank and MTC Apprenticeships, OAS has access to a multi-million-pound annual fund to deliver advanced high-value engineering apprenticeships to eligible SMEs based in and around Oxfordshire and the Thames Valley.

The fund has been set up to support the future skills needed for local engineering and manufacturing businesses to help create the next generation of engineers that are central to the future economic success of the region.

As part of the Chancellor's plans to aid the UK economy's COVID-19 recovery, businesses will now receive a bonus payment of £3,000 per new apprentice hired until September 30, 2021, regardless of age. This is in addition to the £1,000 payment for apprentices aged 16 to 18, meaning that some employers will receive a total of £4,000.

As well as paying for the apprenticeship training, this extra funding now takes the available support up to a maximum of £8,200, significantly offsetting the cost of employing an apprentice for the first year of their programme.

David Hughes MBE, Managing Director of MTC Apprenticeships, said: "Apprentices are set to be instrumental in supporting Britain's economic recovery from the COVID-19 pandemic. As the country begins to re-open after the third national lockdown, manufacturers need to ensure their workforces can meet demand and support their future growth.

"The improved scheme is a fantastic opportunity for businesses of all sizes to take advantage of the benefits apprentices offer. Apprenticeships are already a cost effective way to attract enthusiastic, motivated, new talent, helping businesses to future



proof their workforce and reinvigorate current staff, as well as enabling firms to retain existing expertise by passing on knowledge and skills to the next generation. The OAS advanced manufacturing apprenticeship programmes include exposure to disruptive technologies and new ways of working, empowering apprentices to help their employers to accelerate innovation and increase productivity."

After receiving a record number of applications last year, and with a pool of top quality, pre-screened candidates ready to be matched with prospective employers, the OAS team of training and funding experts is primed to support manufacturers to

attract, secure and fund the best new talent for their business's future.

Local businesses that already employ apprentices include UKAEA and Reaction Engines, Williams F1 and STFC to name but a few.

A series of events are being held to inform SMEs of the business benefits of hiring an apprentice, including a webinar hosted by the Thames Valley Chamber of Commerce, taking later this month.

To find out how OAS can help your business or to attend an SME event, email: Paul.Smith2@the-mtc.org.

Business Benefits

- Addressing skills shortages: apprentices can increase the overall capability of the workforce, improving the quality of service or product
- Apprentices can help bring a fresh perspective and new skills to a team
- They are shown to increase employee satisfaction and loyalty, leading to lower staff turnover
- Supporting an apprentice is a great development opportunity for existing employees and is rewarding and satisfying for them



Events

Bike To Work

If you feel inspired to boost your health and wellbeing in addition to reducing co2 emissions, why not take part in our Bike To Work event?

We are delighted to announce this annual favourite is back on the calendar, which is an excellent way to mark your return to site. Look out for a registration email. Coming soon!



Services

Culham Print Services is an onsite print service offering a wide range of digital and large format printing solutions for UKAEA and external businesses.

Advantages of an onsite service include a quick turnaround / same day service, meetings to discuss your requirements and check proofs and the printing of strictly confidential documents without anything leaving site with waste securely disposed of.

For further information, email: printservices@ukaea.uk

Who's Who

Name: Geoff Clarke

Job: Site Security Manager (Securitas)

Length of service: 3.5 years at Culham Science Centre (CSC)

What does your role entail?

I love my job and thoroughly enjoy working here. I manage a team of 30 people and we are responsible for site security with a response team for all incidents, D4 stores, reception, controlling access to site and patrolling. We have three vehicles for patrol and a 20-person rota to ensure the site is protected at all times. CCTV footage is monitored and we respond to any incidents, from minor to major.

My team is also responsible for managing security when VIPs visit. I have seen a few in my time including Boris Johnson and Prince William. The chopper flying in for Prince Andrew's visit made that one quite memorable! We work closely with personal security teams to plan the visit in minute detail and are responsible on the day for ensuring "cleared" areas remain clear, such as the toilets should the VIP wish to take a comfort break.

What's your background?

I have been working in security for 16 years and for Securitas for eight. Before taking the role at CSC, I was a branch manager for the South West which involved a lot of travel for the position and a multitude of sites.

Tell us about any unusual or funny experiences...

There are lots of things that tickle me, and it most definitely helps to have a sense of humour, but this is one the team will find funny/ annoying. I LOVE Christmas! My team are treated to a daily countdown to ensure they are all aware of how many sleeps it is until the big day. If anyone would like to know, just ask me!



On a more serious note, COVID has definitely provided an unusual experience. My team have been absolutely amazing and I really couldn't have got through it without their support. We have been present on site throughout and I'm pleased to say we are gradually starting to see more people return. We are looking forward to welcoming back more of our Culham community soon.

What do you like doing outside of work?

I spent a number of years pre-COVID converting my garage into a bar. It is one pub that has never been shut! I've recently renovated and updated it and I'm looking forward to being able to invite people over again to enjoy. Does the bar have a name? Yes it does: Bar-Stardo's, but not sure you can print that!

Join the conversation

Culham Science Centre is now live on Twitter, Facebook and LinkedIn. Stay up to date with us - follow us, tag us into your posts, check us in and add us to your LinkedIn profile. We love to stay in touch.



Do you have a story to share?

Email: sarah.lewis@ukaea.uk

