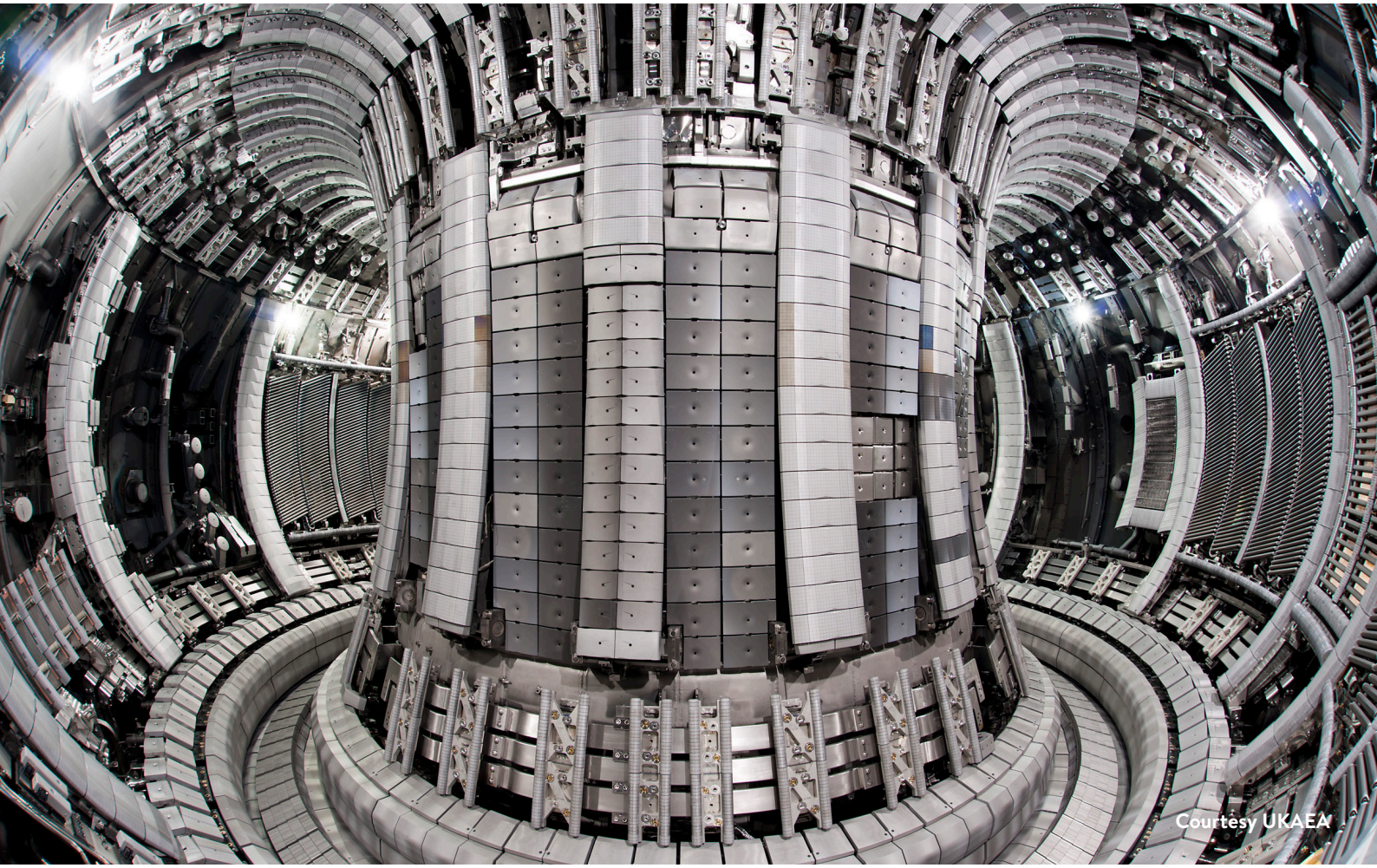
ics cool energy

TCUs USED IN FUSION ENERGY RESEARCH


Courtesy UKAEA

The Challenge

ICS Cool Energy is helping to develop solutions for the clean energy of the future at the Culham Centre for Fusion Energy, one of the world's leading fusion research laboratories where a test facility is using a TCU (temperature control unit) to cool prototype components for use in a future power station where temperatures can reach up to 200 million degrees Celsius.

> The ICS Cool Energy team has been amazingly responsive to our often unconventional demands and provided real practical solutions and advice.

David Hancock CEng MInstP, Development Engineer, Culham Centre for Fusion **Energy**

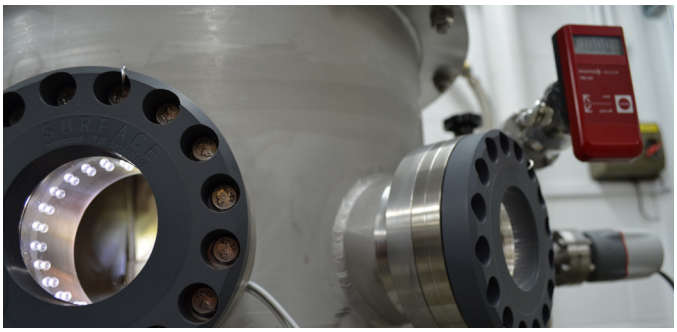
WE MAKE IT WORK

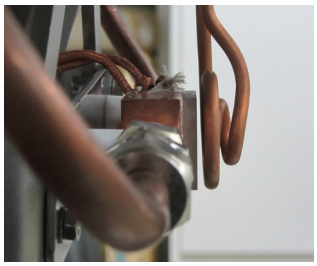
The Solution

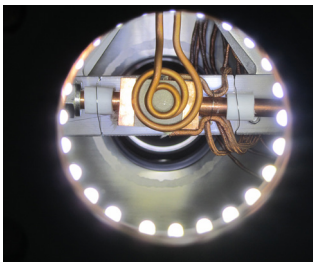
Experts at the Culham Centre for Fusion Energy, part of the UK Atomic Energy Authority, approached ICS Cool Energy to provide support for temperature control on a test rig providing critical research into clean and safe energy of the future.

An ICS Cool Energy high performance 200°C temperature control unit (TCU) fitted with several special options is being used as part of a test facility that cools prototype components. In a fusion reactor it is essential that the walls of the chamber are kept cool enough to prevent any structural damage and the performance of these prototypes is being verified using water being circulated up to a maximum temperature of 200°C.

The components are designed to be used in a nuclear fusion power station which could be a reality by 2040. The process temperatures will reach up to 200 million degrees Celsius which is more than 10x hotter than the sun. This promising source of clean energy will produce electricity by joining hydrogen nuclei to form helium – a zero carbon emsission process.







The Result

The TCU is in regular use as part of the engineering team's ongoing testing programme which is designed to simulate the challenging conditions created in the production of nuclear fusion power.

"Just this morning, we tested components using 5 MW/m^2 of heating and the temperature control unit more than adequately coped with providing the cooling and prevented the components from melting. There's a long way to go yet, with more intensive testing scheduled so our demands on ICS Cool Energy's equipment are set to continue," said David Hancock, Development Engineer.

The TCU came fitted with a number of special options which included an external bypass with flow control valve fitted, pressure gauges on outlet and inlet, and a relay in the level system providing a volt-free contact to the main PLC. This ensures that any leak in the process can be detected almost immediately, preventing damage to the expensive vacuum and heating systems in the test facility. The fill line from the supplied ICS Cool Energy chiller unit was also isolated, minimising the volume of lost water in the case of a leak.

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Our International offices:

Ireland: +353 (0)46 92 52934
Germany: +49 (0)7046 88087 0
Netherlands: +31 (0)88 258 258 0
Switzerland: +41 (0)55 415 91 09
Austria: 00800 0116 0117
France: +33 1 60 66 80 83

UK SALES: 0800 774 7426

info@icscoolenergy.com