



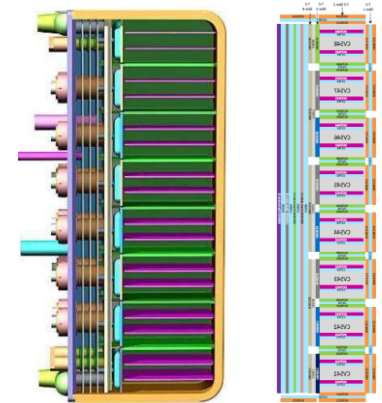
Accident analysis and safety case development for the ITER Test Blanket System (TBS)

Jacobs is working with F4E to develop advanced fault studies models for the European ITER Test Blanket Systems, and to build a robust safety case to support the licensing of these advanced nuclear components. This experience of performing safety analysis and producing safety documentation that meets regulatory requirements can be applied to novel or complex systems in fusion, fission and non-nuclear environments.

The technology

Jacobs used the fusion-adapted MELCOR and RELAP5-3D accident analysis codes to model the Helium Cooled Pebble Bed (HCPB) and (now discontinued) Helium Cooled Lithium Lead (HCLL) Test Blanket Systems. The team's detailed understanding of these codes provided models capable of simulating a wide range of accident scenarios.

Subsequently, Jacobs has supported F4E by reviewing safety documentation for the HCPB Test Blanket System, identifying opportunities to strengthen the safety case further and recommending ways to do that.



The HCLL Test Blanket Module (left) and MELCOR model (right)

Fault studies analysis in complex environments

The HCPB and HCLL Test Blanket Systems present many challenges to the fault studies analyst. These include resolving complex three-dimensional temperature fields, beryllium-steam chemical reactions and magneto-hydrodynamic effects (due to the ITER field coils), alongside the interaction of the Test Blanket System with the surrounding ITER machine. The safety demonstration must account for phenomena not encountered in fission reactors.

New Applications in Accident Analysis and Safety case development

Accident Analysis

Jacobs' ability to develop robust and representative fault studies models of complex systems is demonstrated by its work for F4E. This success is built on expertise in mathematical modelling, a detailed understanding of the simulation tools used, and experience in performing safety analysis for a wide range of systems.

Safety Case Development

The production of safety documentation that meets regulatory requirements is a core capability for the Jacobs' team. Working with F4E, Jacobs has demonstrated agility in transferring this knowledge to advanced and novel systems. The work builds upon skills developed in reactor new-build design assessment and licensing programmes.

Collaboration opportunities

Opportunities include collaboration on safety studies and safety case development, as well as fault studies analysis to demonstrate safety for complex systems in fusion, fission and non-nuclear environments.

Fusion for Energy
Email:
technologytransfer@f4e.europa.eu