UK Atomic Energy Authority

RACE

Supplier Event

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Head of Operations, RACE

July 2020

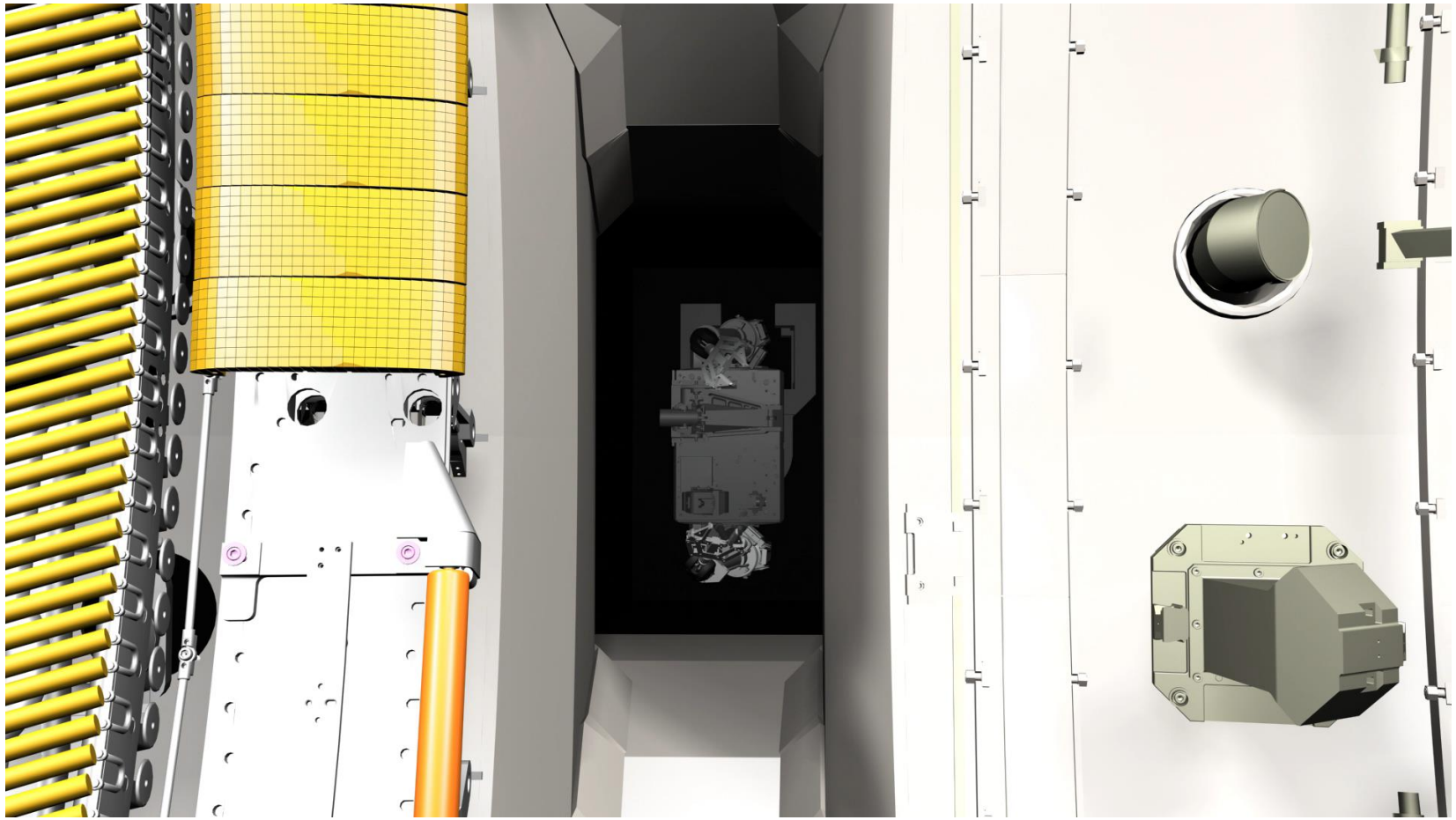
RACE

RACE is the UKAEA's centre for "Remote Applications in Challenging Environments"

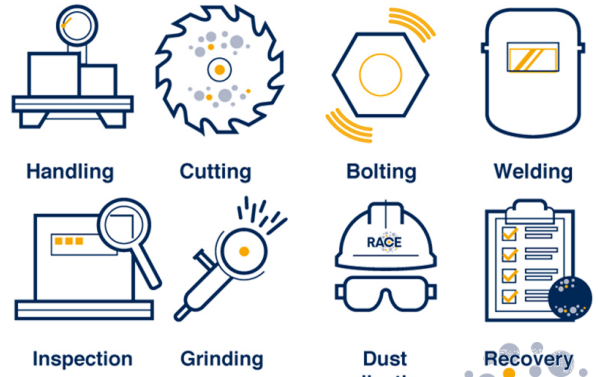
RACE was created in 2015 in order to exploit the capabilities developed for the JET remote handling system

Our purpose built facility at Culham was opened in 2016 and houses our multi-disciplinary engineering team and a work hall designed to accommodate large scale mock-ups.

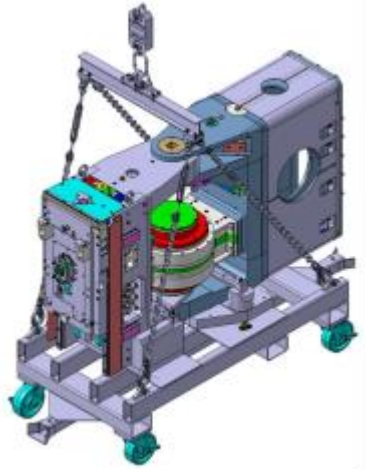
Building on JET fusion technology



- **>30,000** hours of operational experience
- **8** shutdown programmes, including the replacement of the entire “first wall”, using over **350** separate remote handling tools and replacing over **7,000** components over 18 months.



Planned procurement in FY20-21For JET Programme



•Stillages for Boom Extension and VTS (diagram shows Stillage supporting Boom Extension).
•Approx value £25k per stillage. 2 off required.

•- Boom Simulator production units –
•Approx value £1.5k each

BIC Test Bench
Approx value £20k.

- Data Acquisition System hardware, approx value £10k.

Boom Control cubicle, similar to photo.
Approx value £40k

Boom Interface Control Cubicle, similar to photo.
Approx value £30k

Further information available from:
Chris.Dabreo@UKAEA.uk

Planned procurement in FY20-21
Mascot Manipulator Related

UK Atomic Energy Authority

Planned Procurements for Mascot – total value in FY20-21 approx £734,000

Mascot Locale Station

- Actuators
  - Safety Encoder
  - Brushless DC Motor
- Drive Systems
  - Gears
  - Capstans and Tendons

Remote Cubicle

- Motor DC Bus PSU
- Power Tools PSU
- Servo Drives
- Safety PLC
- Control System Software Controller (PLC)
- Control System I/O
- Auxiliary PSUs (i.e. for Brakes, Potentiometers)

Further information available from:
Sam.Eniade@ukaea.uk

Remote Manipulator

- Actuators
- Potentiometers
- Brushless DC Motor
- Thermistor
- Resolver
- Gearbox
- Drive System
- Gears
- Capstans and Tendons

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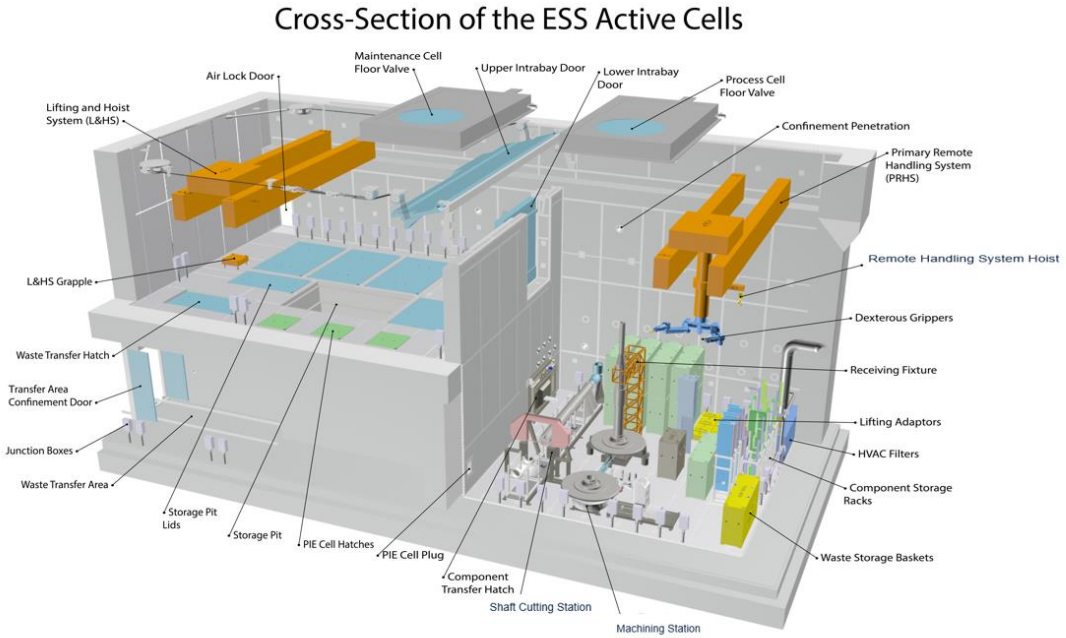
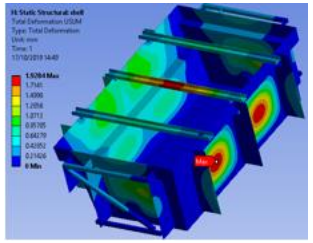
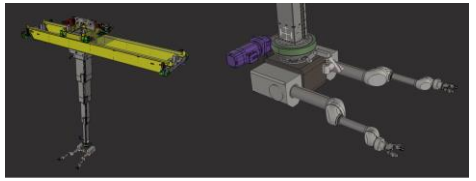
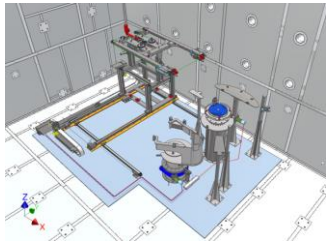
ESS Facility





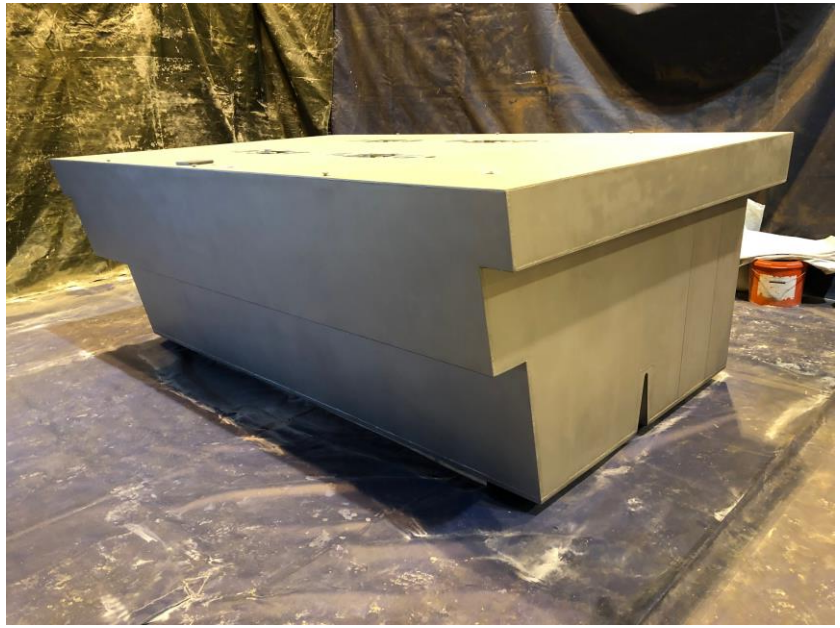


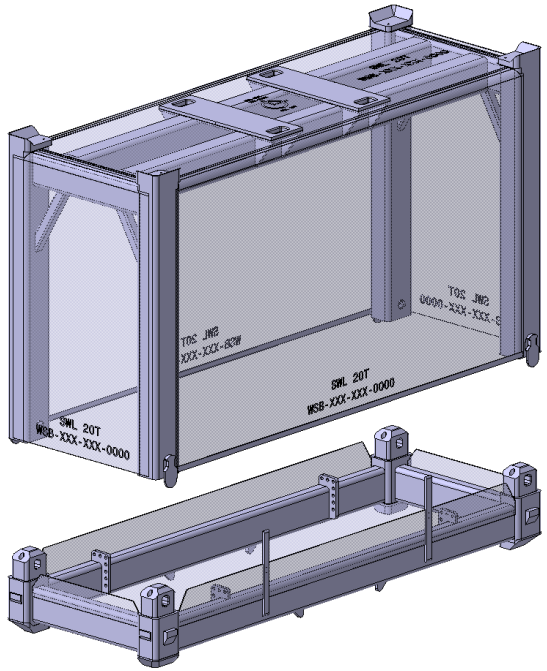


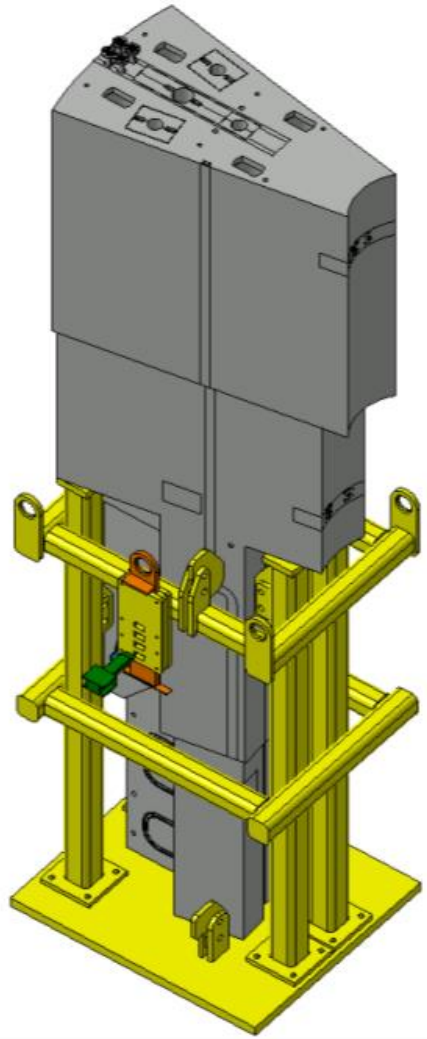
Future Procurements

Procurements through 2020:

- Pit & PIE Cell Lids
- Electrical Installation
- Control Room Infrastructure
- Fabricated Assemblies, Tooling & Stillages, Lifting Adaptors
- Safety System



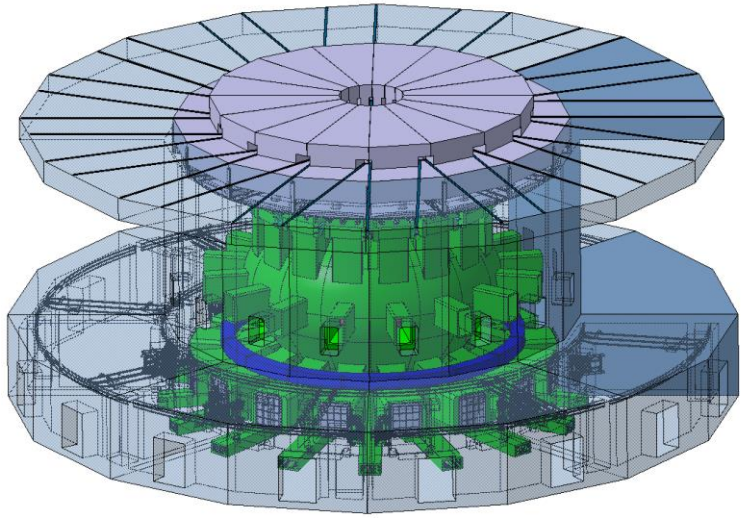


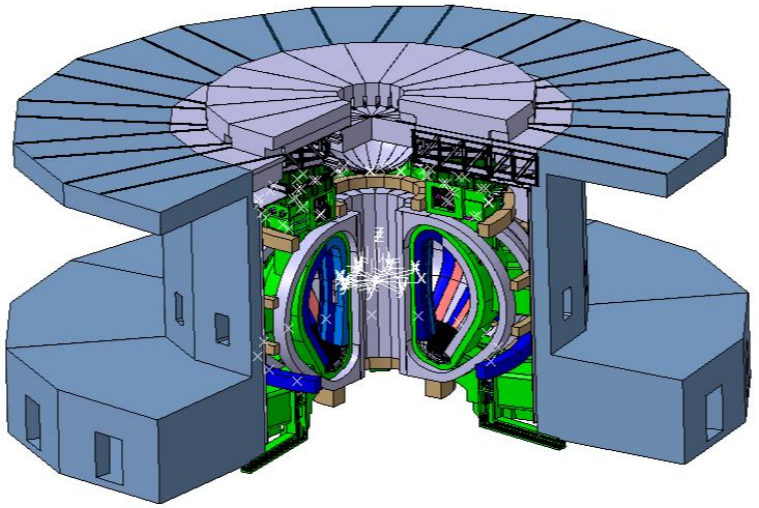


DEMO WPRM – Project Summary

The primary objective of the WPRM Project (in FP-8) is to deliver a feasible, integrated concept design for the Remote Maintenance system for DEMO that, with an acceptable confidence level, can be shown to meet the requirements of the DEMO Plant

In FP-9 the project will deliver a baseline conceptual design of an integrated maintenance system for DEMO. The design will be demonstrated as technically feasible, with technology choices shown to be viable, resulting in a licensable architecture





AWP20 Procurement Tasks

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Industrial (consultancy) Tasks

- Seismic mitigation strategies for DEMO RM Systems
- Blanket transporter dynamic modelling
- TARM dynamic modelling
- Contamination control strategy development (ex vessel)

Hardware Procurement Tasks

- Intermodular service connection joint development
- Proof of Principle development for small-bore optics
- In-bore position sensory unit R&D
- Supply and testing of proof of principle Post Weld Heat Treatment (PWHT) tooling

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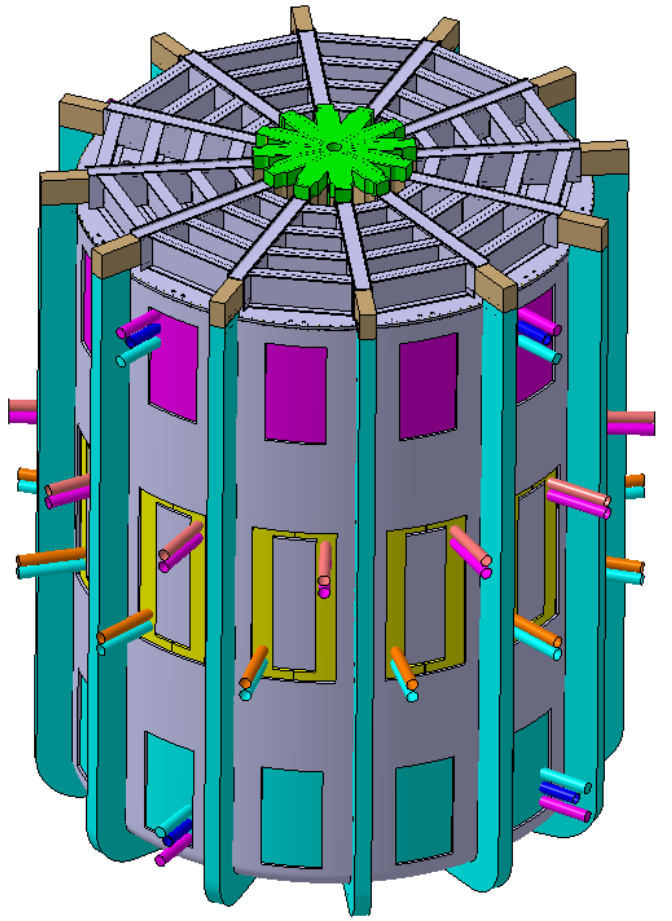
STEP – Project Summary

The STEP project objective is to design a commercially viable, compact fusion reactor, collaborating with partners to build a UK prototype by 2040

The Plant Lifecycle (product) work package is to provide confidence that the proposed Concept and Prototype Reactor's Plant lifecycle is Safe, Affordable, Available and Technically Credible.

All aspects of the STEP plant lifecycle, is defined as;

"**Construct, Assemble, Commission, Operate, Maintain, Manage Waste and Decommission**"



STEP Procurement Tasks FY20

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Construction Studies

- Identification of Construction Standards, Regulations and Classification of Structures & Buildings
- Building cost drivers (e.g. height v excavation)
- Options for Logistics and Transport to Site
- Lessons learned from other large infrastructure projects

Maintenance Studies

- Transfer solutions
- Contamination control solutions
- Storage, disposal, and waste management
- Refurbishment and maintenance solutions

RAMI – Initial Model for Availability Studies

Waste Management and Decommissioning Studies

- Preferred Waste Handling and Decommissioning Strategy for STEP
- Prototype Integrated Waste Strategy Document for SPR
- Development of Isotope Separation Technology

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NNUF2 - Overview

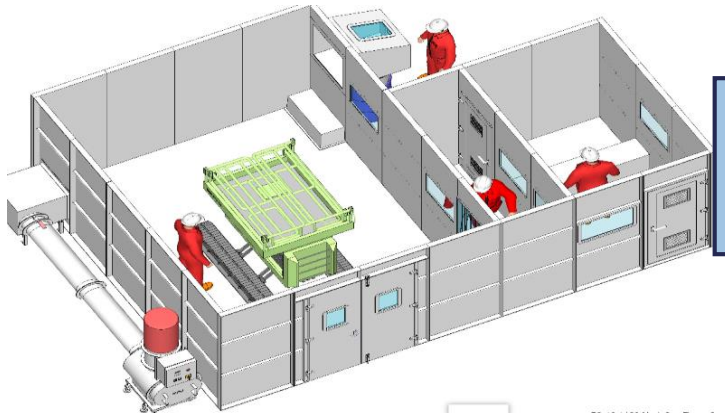
- £3M EPSRC funding received for a portable reusable facility for cold testing and hot deployments
- Available to academics & industrial users

- 3 year Project duration
- Partners are UoB, UoM,NNL
- Large range of kit & mock environments available to hire

ISO Container 1: Control Room

ISO 2: Flexible Toolkit
Robot arms, UAV, UGV, sensors

Arrive at location → *Setup Control Room* → *Setup Toolkit* → *Setup ISO 3* → *Perform Work* → *Return to UKAEA*



ISO 3: Collapsible, modular bagging & decontamination Station.

Mock-ups

UAV/UGV Tests

Demo End Uses

Training

Hire kit

Cold Test facility @ UKAEA housing mock-ups

NNUF2 – Procurements FY 20/21

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Control Room ~ £120k

2 x Haptics

2 x arms

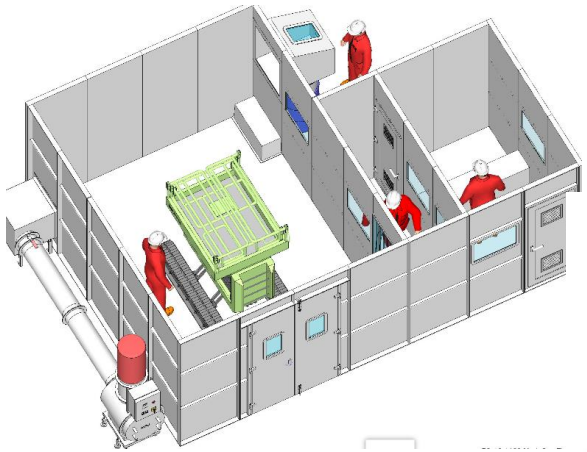
Walking Bots

Contact: *nnuf-hr@race.ukaea.uk*

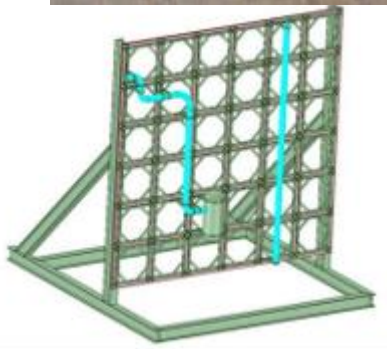
Barrel Store

Mock up Rigs

Glovebox



Collapsible, modular bagging & decontamination Station ~£200k.



Pipe Wall

Cold Test facility ~ £350k

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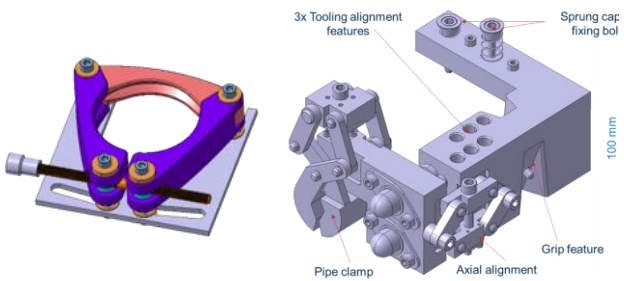
ITER Robotics Test Facility (IRTF) Programme

- RACE is hosting ITER Organisation Remote Handling Cold Test Facility, which is called ITER Robotics Test Facility (IRTF)
- IRTF is an off-site programme of mock-up trials, driven by the need to provide feedback to the component designers during the design phase, hosted at RACE.
  - When maintenance operations are perceived to be new (due to evolving radiation maps) or hazardous for remote handling, then **physical mock-up trials** are recommended to ensure the ITER components are maintainable remotely.
- There are now 4 completed projects, 9 active projects and many more projects in the pipeline that require strong support from supply chain

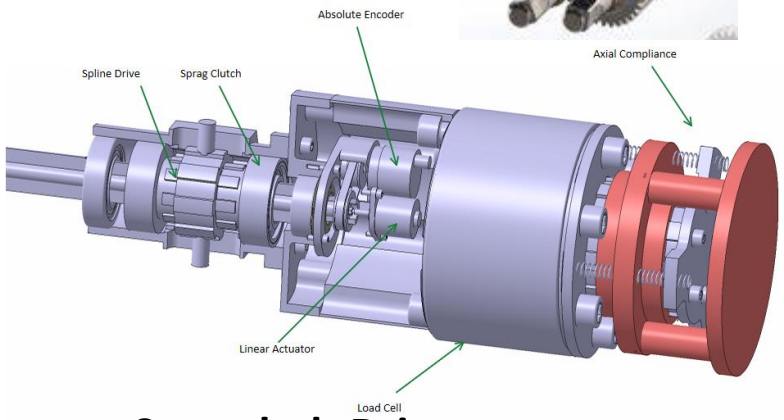
Supply chain requirement

- Large structure fabrication
- Precision machining
- Machinery design specialist
- Non-destructive testing specialist
- Robot automation
- Electrical systems design and manufacture

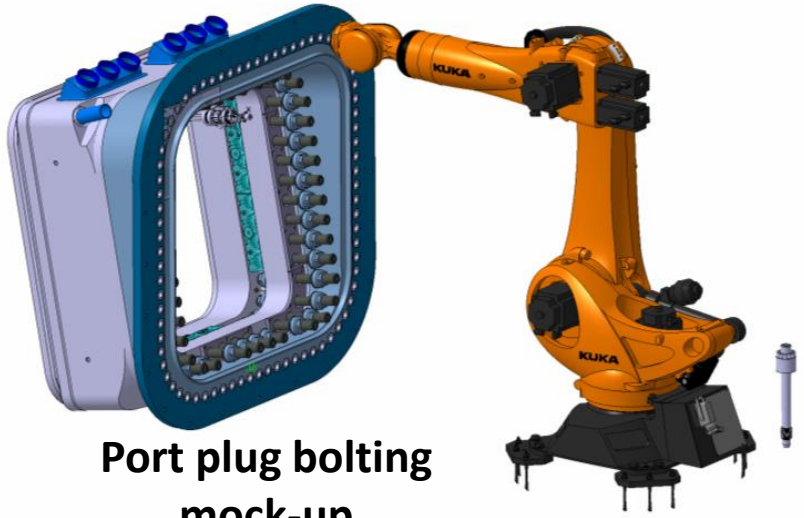


Flange bolting tool

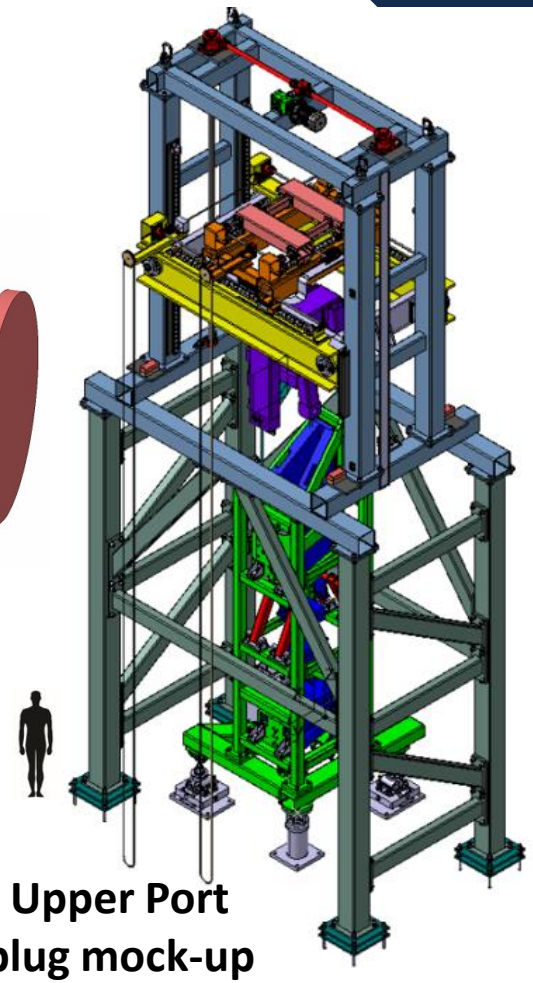
Test Blanket Module mock-up



Super bolt Drive system



Port plug bolting mock-up



Upper Port plug mock-up

- 12 m high
- 45 tonnes

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Questions

nick.sykes@ukaea.uk

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