

The ingenuity of our people creates endless possibilities

AL

BABCOCK

We aspire to be the most trusted and valued support services company

The Importance of Construction Tooling -ITER Bracing Tools

altradbabcock.com





- Introduction to Altrad Babcock 1.
- 2. The need for construction tooling
- ITER Bracing Tools 3.
- 4. Our History and Aspirations in Nuclear and Fusion Power



Introduction to Altrad Babcock

Asset Management

Provision of engineering consultancy services including Integrity Engineering, Inspection, Testing and specialist Manufacturing services

Nuclear & Defence

Process & Energy

Global Service Centre

Full lifecycle of services - from new build to decommissioning

Specialist process engineering, service and construction World class global Babcock service delivery

Working collaboratively with a range of clients, our 130 year heritage and extensive experience ensures we consistently provide advanced and cost-effective technical solutions for long term value.









What is the need for construction tooling?

- Tokamak components are large, heavy, costly and complex shapes that are irreplaceable with regard to the projects success.
- Tokamak components need to be lifted safely, within tight space constraints and with extreme care.
- VVS & TFC need to be restrained from relative movement during lifting, handling and seismic events.
- Construction tooling must enable adjustability between restrained components and final position.
- Bespoke tooling required due to limited interface points on components.

Bracing Tools installed and in use at ITER





Lift configuration

Purple elements in images show the various bracing tools installed on VVS & TFC assemblies

Red Circle - Mid Plane Brace



Final configuration

Overview ITER Bracing Tools Project

- Altrad Babcock had to Design, Manufacture, Test and Deliver Bracing Tools for handling and assembly of the Vacuum Vessel Sectors (VVS), Toroidal Field Coils (TFC) and Vacuum Vessel Thermal Shield (VVTS) assemblies.
- 7 different types of braces used for restraining parts.
- Real time remote load monitoring had to be built into the system.
- Bespoke test rigs were designed and manufactured.
- Test rigs built and operated at Altrad Babcock facility in Renfrew.











Test Rig 1 & Mid Plane Brace (MPB)





Design & Manufacturing

- Concept design provided by the client and developed during project execution.
- Bespoke steel structural design.
- Challenging dimensional tolerances and adjustability requirements.
- Design and manufacture of bespoke and modular test rigs.
- Subcontracted fabrications
- Quality assurance governance
- Industry-leading QHSE record

Mid Plane Brace (MPB) parts



ITEM	Category	Worst load case	Testing Load
Vertical beams	Steel structure		
Horizontal beam	Steel structure	#5 Ref [2]	F _{TEST =} 1,25 x PL
Linking arms	Steel structure	A:: DFL x PL =1290kN	FTEST = 806 kN
VVS clamping system	Steel structure		

MPB Test Definition

Test Rig 1 & MPB



Wireless load monitoring









Test Rig 2 & MPB



Mock-up and validation of assembly process

Testing

Bracing Tool: Mid Plane Brace (MPB)

- Purpose: Restraint tool connecting to the vacuum vessel sector and TFC coils used during lifting. Located at the middle of the assembly being lifted.
- Test rigs designed and manufactured by Altrad Babcock.
- Interfaces designed to replicate site conditions to prove form, fit and function.
- Test rigs designed to apply 1.5 x pay load = 806kN
- Validation of wireless load monitoring.
- Validation of assembly process for novel bolting system.



Our History and Aspirations in Nuclear and Fusion Power

- Over 70 years of experience in nuclear, supporting the UK Nuclear programme from Calderhall in 1952 to the current Nuclear New Build programme
- By growing our relationship with the ITER Organisation and UKAEA, we are adapting our operations and business to support Fusion through the full lifecycle
- We have evolved our Fusion support, from a service provider through a ITER Tokamak Engineering Support Framework to an independent supplier at ITER with project success
- Our approach utilising our localised operations hubs and partnering with local companies has allowed us to further increase our scope of support to both ITER and UKAEA





Our aspirations in Fusion

- Continued support to the success of the ITER Programme through F4E
- Support to the UKAEA and development of STEP
- Long term goal to be a preferred partner for commercial Fusion operations both domestically and overseas



The ingenuity of our people creates endless possibilities

ALTI

Altrad 2026 Strategy

it all begins with a desire to create a better tomorrows to

ALTRAD

g

Thank you for your time! Any Q's?