# *TechnoFusión*, a relevant facility for fusion technologies: the Remote Handling area

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The National Centre for Fusion Technologies, *TechnoFusión*, a specific research centre for fusion technologies is projected to be build in Spain, which will include a large number of top facilities for the fusion technological development. Currently no similar facilities to TechnoFusión exist, so it will provide more realistic tests helping in the fast track to DEMO and IFMIF.

The present document summarizes a review of the different *TechnoFusión* facilities with special emphasis on those proposed for remote handling (RH) applications. The poster will review the technical specifications concerning the RH facility, the analysis of the mock-up components and tests to be performed, and the relevance of the RH lab capabilities, particularly the required equipment under irradiation conditions.
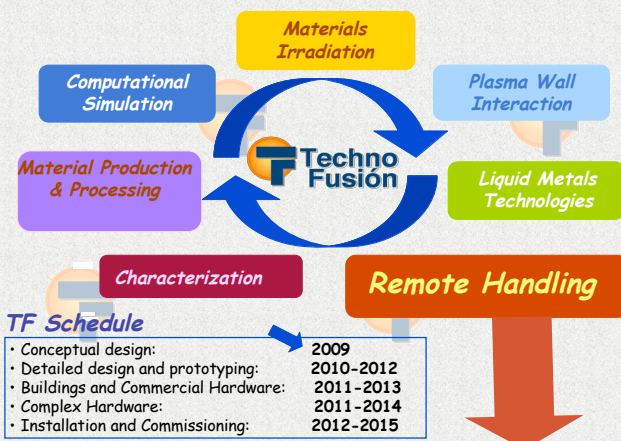


The *TechnoFusión* technological activities will be focused on:

✓ implementation of advanced materials manufacturing technologies,

✓ evaluation of radiation effects on low activation structural and functional materials,

✓ material testing under stationary plasma conditions and transient events (ELMs),

✓ *in-beam*, *in-situ* and after irradiation characterization of materials,

✓ free surface and materials compatibility studies in liquid Lithium under ionizing radiation,

✓ validation and development using computer simulation and

✓ development of robotics and automated systems for remote handling

## TF Schedule

| | |
|---|---|
| · Conceptual design: | 2009 |
| · Detailed design and prototyping: | 2010-2012 |
| · Buildings and Commercial Hardware: | 2011-2013 |
| · Complex Hardware: | 2011-2014 |
| · Installation and Commissioning: | 2012-2015 |

## MAIN OBJECTIVE

**A facility where telerobotic tasks for the maintenance and repair of nuclear fusion installations can be developed and tested**

### Laboratory for Irradiation Test

A large irradiating facility connected to an electron accelerator (Rhodotron®-type) able to:

✓ test prototypes (DPP and TBM for ITER, IFMIF irradiation modules, …) with gamma radiation under conditions similar to those experienced during maintenance operations inside a reactor.
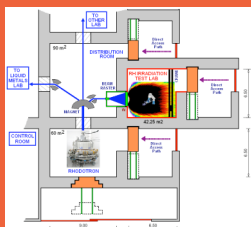


✓ irradiate the manipulators to a large extent while performing repetitive operations.

Gamma radiation generated by means of a 10 MeV electron beam accelerator scanning on a 1500 × 1500 × 6 mm W wall (beam incidence angle 53°).

Predefined effective irradiation volume of $5 \times 5 \times 4$ $m^3$.
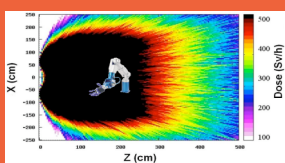


Radiation influenced area will be concentrated in a small volume inside the *Irradiation Room* (about $4m^2$ or less) to obtain 2-3 kGy/h. The gamma dose being: at least 500 Gy/h at the first row, higher than 100 Gy/h in a second row.

### Remote Handling Design and Development Test Facility

✓ Validation and improvement of RH procedures.

✓ To be used by different client projects needing to demonstrate the feasibility of the RH operations associated to their components.

Large building containing the mock-up components to be remotely manipulated and the RH equipment.
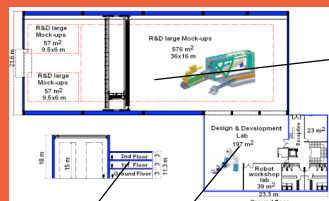


Main equipments considered for this space: two hydraulic powered tele-manipulators placed on a mobile platform coupled to a crane of 40 tons with 6 degree of freedom, and some devices for human interfaces (haptics devices, stereoscopic cameras and voice recognition). A control room will be required for RH equipment manipulation.

*Laboratory of Robot Design & Development*, to design industrial-like robot systems or robotic structures that support adapted tools to work under such new and hard conditions.

*Laboratory of Tele-operation & Control*, where definition and testing of RH procedures will be held. Concentrated mainly in bilateral tele-robotic control systems.

*Laboratory of Virtual Reality*, focussed on simulating RH processes, evaluating manipulation forces and interaction with virtual objects. Advanced human interfaces will be provided for these works.