

APPLICATION OF REMOTE HANDLING COMPATIBILITY ON ITER PLANT

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The ITER plant will require fully remote maintenance during its operational life. For this to be effective, safe and efficient the plant will have to be developed in accordance with remote handling (RH) compatibility requirements. A system for ensuring RH compatibility on plant designed for Tokamaks was successfully developed and applied, inter alia, by the authors when working at the JET project. The experience gained in assuring RH compatibility of plant at JET is now being applied to RH relevant ITER plant.

The methodologies required to ensure RH compatibility of plant include the standardization of common plant items, standardization of RH features, availability of common guidance on RH best practice and a protocol for design and interface review and approval.

The protocol in use at ITER is covered by the ITER Remote Maintenance System (IRMMS) defines the processes and utilization of management controls including Plant Definition Forms (PDF's), Task Definition Forms (TDF's) and RH Compatibility Assessment Forms (RHCA) and the ITER RH Code of Practice.

This paper will describe specific examples where the authors have applied the methodology proven at JET to ensure remote handling compatibility on ITER plant. It will also examine the application of appropriate tools and review the challenges involved where multiple international stakeholders are involved.

Examples studied are:

- ELM Coils (To be installed in-vessel behind the Blanket Modules) – Handling both in-vessel, in Casks and at the Hot Cell as well as fully remote installation and connection (mechanical and electrical) in-vessel.
- Neutral Beam Systems (In-vessel and in the NB Cell) – Beam sources, Cesium oven, Beam Line components (accessed in the NB Cell) and Duct Liner (remotely replaced from in-vessel).
- Divertor (In-vessel) – Cooling pipe work and remotely operated electrical connector.
- Upper Port Plug (on Tokamak) – Blanket Shield Module (BSM) pipe work, BSM installation and ECM Steering Mirrors

The RH compatibility process can significantly affect plant design. This paper should therefore be of interest to all parties who develop ITER plant designs.