

U.S. Contribution to ITER Remote Handling Technology

ORNL Remote Systems Group

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Outline

- Previous ITER participation
- RH R&D/design activities since ITER
- RH Experience relevant to the ITER contribution
- Importance of Remote Handling
- ORNL's proposed contribution
- Conclusions

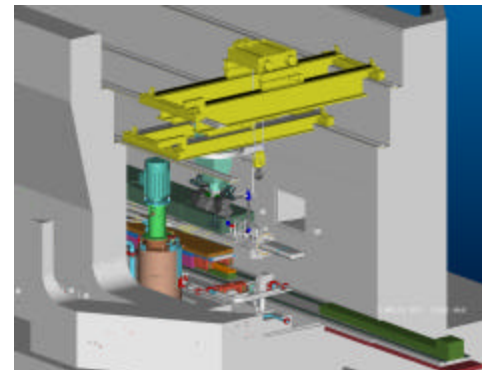
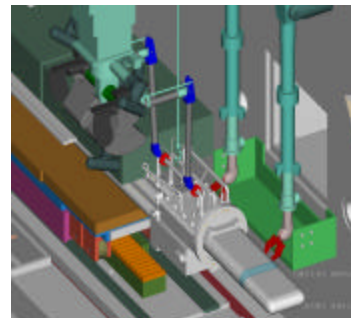
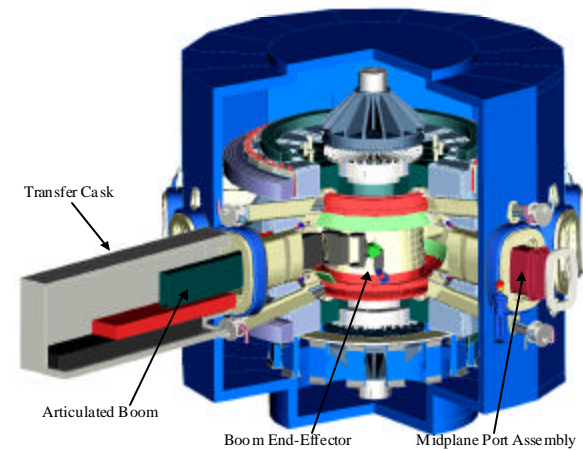
(Details are provided in a White Paper entitled
“U.S. Contribution to ITER Remote Handling Technology.”)

U.S./ORNL Contribution to Remote Handling During ITER CDA and EDA Phases

- Personnel assignments to JCT for R&D and design
- Developing laser-based, in-vessel metrology system
- Developed and tested vacuum vessel cutting and welding equipment (Rockwell)
- Authored the “ITER Remote Handling Design Manual” and “Radiation Hardness Design Manual”
- Tested high-rad, vacuum compatible electrical connectors for RH
- Designed port assembly handling/transport systems

What has the Remote Systems Group done since then?

- Responsible for developing test cell/hot cell remote handling systems for FIRE
- Development of the in-vessel metrology system continued
 - Precision range measurements on TFTR,
 - Elaborate mapping of plasma facing surfaces in NSTX, and
 - Phase 2, SBIR grant is in place for development of a next-generation, reactor relevant metrology system
- Major role in SNS and other projects



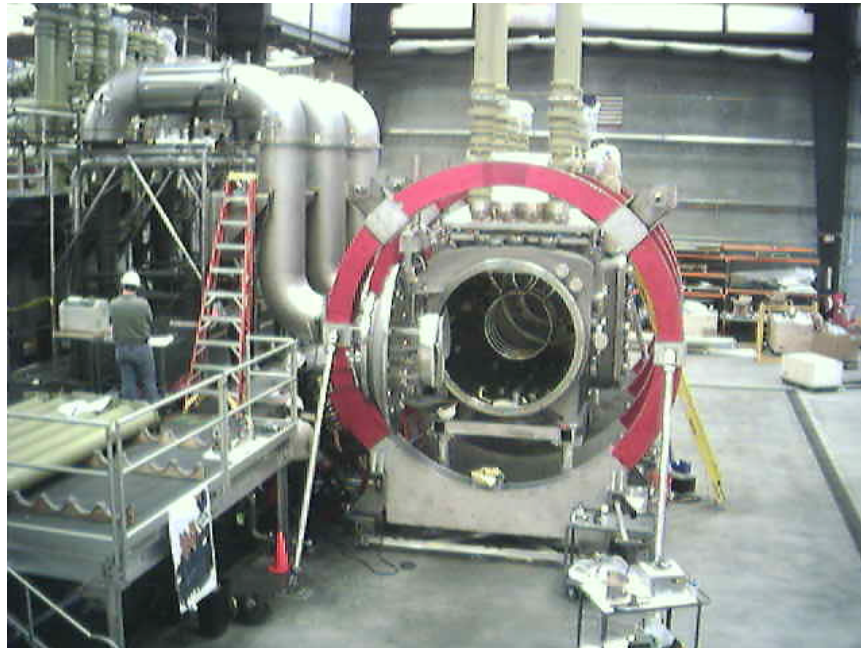
Experience Gained From ITER Applied to U.S. Projects Funded and Under Construction

- Development and testing of remote handling equipment for the Spallation Neutron Source since 1998
 - RH equipment design and procurement (lifting equipment, manipulators, tools, windows, cameras)
 - Hg target and process systems design and procurement; RH testing, tools, ...
 - Small scale mockups to test critical components and tools
 - Full size mockups to demonstrate equipment performance and procedures



U.S. Projects Under Design/Construction (cont.)

- The Remote Systems Group is responsible for the conceptual design of remote handling equipment for the Archimedes Filter Plant since 2002
 - High level, rad waste process system based on plasma mass separation
 - Remote handling issues are similar to magnetic fusion



Why is Remote Handling an Important Contribution?

- RH technology ensures that ITER components can be maintained to meet Availability Goals, leading to cost-effective reactor operations
 - Uptime is valuable to the experimenters, downtime is costly (\$100K/hr ??)
- No one is interested in having a reactor system that does not work effectively
 - A \$5B+ investment cannot be idle beyond what was planned for (\$/neutron produced ??)
 - Components cannot be retroactively modified to be maintainable without incurring significant cost in dollars and downtime

How And What Can ORNL Provide

- Leverage the experience, facilities, and equipment of the Remote Systems Group
 - Build upon the previous ITER RH participation which included personnel assignments, design oversight, metrology development, VV cutting and welding, etc.
 - Capitalize on the SBIR-funded development of a reactor relevant metrology system
 - Take advantage of funded-project experience from the last 5 years of SNS design, development, and testing, and experience obtained from other projects
 - Use existing ORNL high bay facilities and remote handling equipment as a Fusion Remote Handling Test Facility

Conclusions

- Remote handling systems R&D and design ensures maintainable subsystems and components leading to effective reactor operations
- ORNL has the experience and the facilities to support ITER Remote Handling Technology

