

Co-op Experience at the Materials and Fuels Complex at the Idaho National Laboratory

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August 2020



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**Idaho National Laboratory
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What is Remote Engineering?

- A hot cell is a shielded radiation environment typically used for examining and testing reactor fuel rods. Due to background radiation, hot cells cannot be entered for maintenance. Tooling and equipment is extensively tested and mocked up to ensure it will work.
- Telemanipulators, electromechanical manipulators, overhead cranes



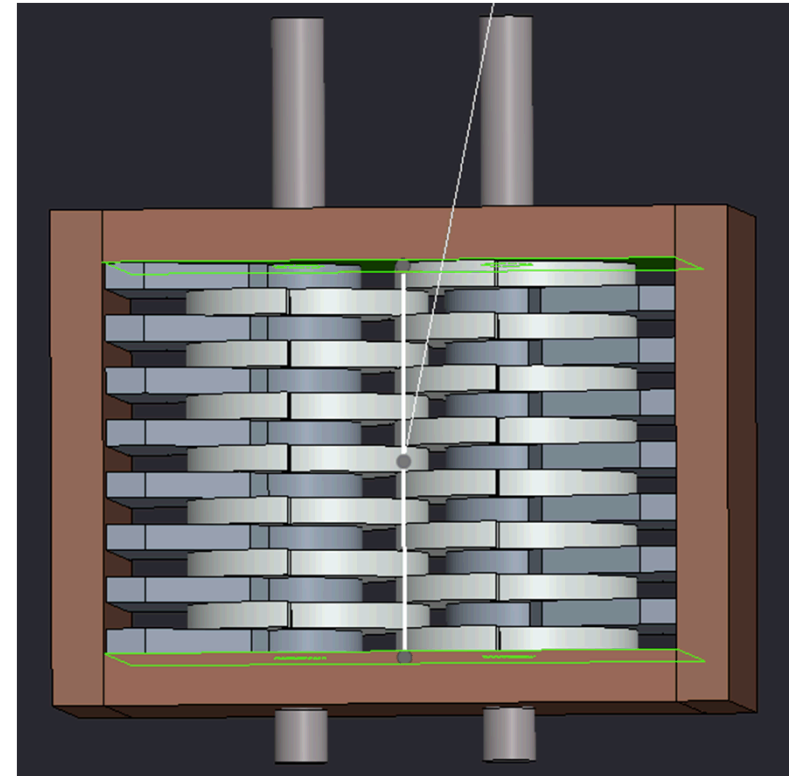
Telemanipulators inside the Hot Fuels Examination Facility

Bottle Shredder Replacement

A bottle shredder is used remotely using only telemanipulators in the Analytical Lab. This helps with waste removal. The plastic buildup ruined the shredder, so replacements were needed. Not all assembly components were released drawings.

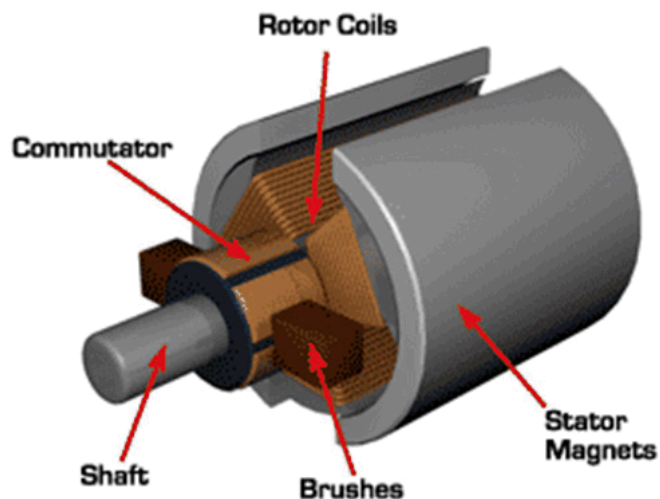
What I did:

- Designed shredder assembly with cutting wheels and spacers on hex shafts
- Identified parts for machining and ordering
- Worked to detail and check sketches prior to releasing an assembly drawing



Model of the bottle shredder

D.C. Motor Brush Test



A motor's internal components

The hot cell environment of the Hot Fuels Examination Facility is a pure argon atmosphere. This allows for post irradiation examination of fuels and materials. Motor brushes require oxygen and moisture to run properly. In the argon atmosphere of HFEF, brushes rapidly deteriorate and fail. Tests to find the optimal brush material need to be done. A test chamber was located and will be used to replicate an argon atmosphere.

What I did:

- Selected fittings to seal the test chamber
- Designed an easy to remove lid that would provide a seal
- Wrote a test plan and submitted for review

Sample Preparation Laboratory Conceptual Design

The Sample Preparation Laboratory is a new nuclear testing facility undergoing construction.

What I worked on:

- Reviewed drawing packages for inconsistencies
- Verified the examination equipment is compatible with the facility design parameters and can be operated and maintained remotely using telemanipulators and robotic arms.
- Checked room sizing for material transfer operations
- Estimated telemanipulator reach requirements for normal operations
- Gathered and condensed equipment information for facility requirements

Window Thread Repair Tool

Hot cell windows are four-foot-thick layered glass. During an A-slab replacement (the 2" cover window in-cell), the remote pneumatic wrench cross threaded several bolts. The threads are in-cell, requiring remote tooling for repair.

What I worked on:

- Identified functional requirements and engineering inputs for the design
- Designed a mount for pneumatic and electrical components to facilitate remote operation
- Designed test plates for verification testing.



One of the windows in HFEF

