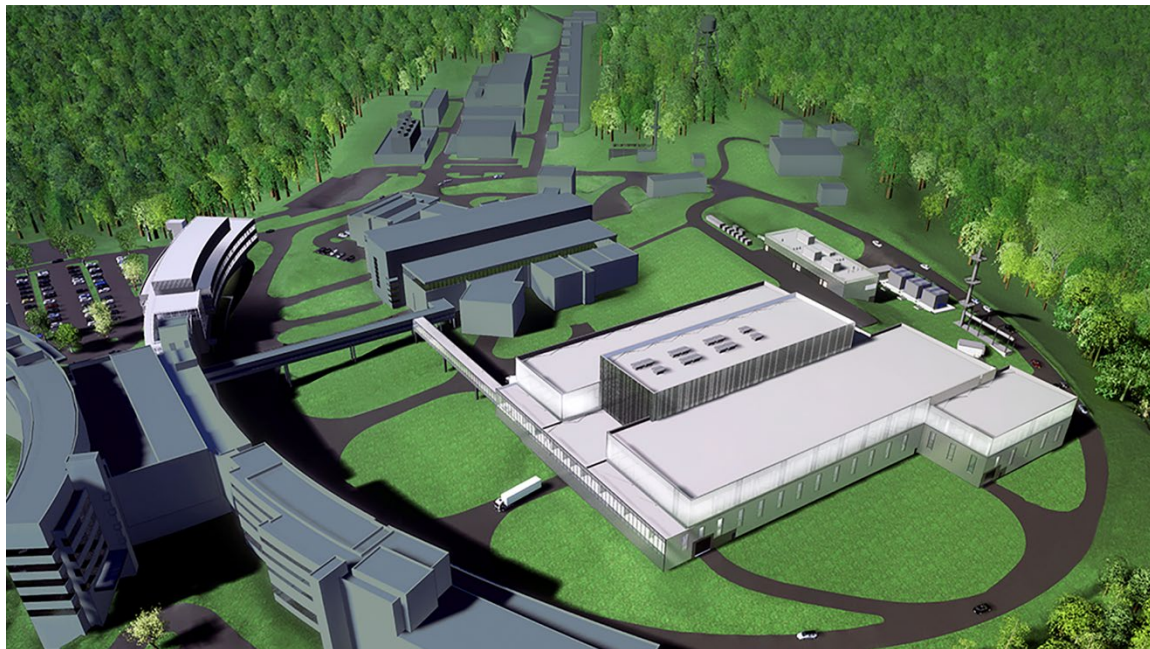


Second Target Station Project: Target Assembly Installation Plan



Aaron Jacques
Ethan Rummel

April 2024

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S03020000-TDO10000

Second Target Station Project

TARGET ASSEMBLY INSTALLATION PLAN

Aaron Jacques

July 2026

Prepared by
OAK RIDGE NATIONAL LABORATORY
Oak Ridge, TN 37831
managed by
UT-BATTELLE LLC
for the
US DEPARTMENT OF ENERGY
under contract DE-AC05-00OR22725

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1. PRE-INSTALLATION ACTIONS

Manufacturing Plan S03020000-PLN10000 details the fabrication process, including assembly and checkout on a test stand. The scope of this document serves to illustrate the sequence of events and key considerations that occur after manufacturing and assembly until installation is complete in the core vessel. Before installation, the target assembly will undergo a full factory checkout to ensure all requirements have been met and the system operates as intended [1]. The installation process aims to move the target assembly without impacting the functionality established in the test stand.

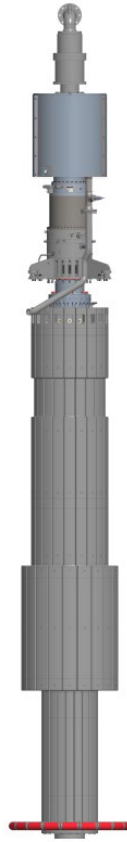


Figure 1. Configuration of Target Assembly, at end of testing, and before disassembly

2. DISASSEMBLY

The target assembly will be fully assembled and functional in the test stand and must be partially disassembled to for safe transportation and to fit into the core vessel shielding. The core vessel shielding, and lid have been designed to accept the shaft without segments attached. The installation process for the core vessel lid and shielding are captured in their respective installation plans.

3. LIFTING CONFIGURATION

The target segments will be removed from the shaft prior to removal from the test stand. The segment removal will involve blow-down of all water and disposal of all gasket materials. Bolts securing the segments to the shaft may be re-used.

The target assembly will be lifted from the stand using a spreader beam from the facility crane. The target vessel lid will be integrally mounted to the drive due to the bearing support collar. The spreader bar will ensure that the lifting slings do not interfere with the valve manifold. The lift points will be attached to the structural support ribs on the drive housing. The target assembly and testing will occur in the same facility as the core vessel. The facility crane will move the drive and shaft from the test apparatus to the high bay, and into the core vessel. No on-road transportation of the assembled system shaft and drive is planned.



4. TARGET SYSTEM CONFIGURATION FOR PRIOR TO INSTALLATION

The target vessel may be installed in the core vessel quite late in the installation process. The following items may already be installed in the core vessel:

- Core vessel shielding (all except the removable shield blocks used for target replacement)
- Moderator and Reflector assembly
- Target Viewing Periscope
- Core vessel lid, without top closure or bellows
- Process piping

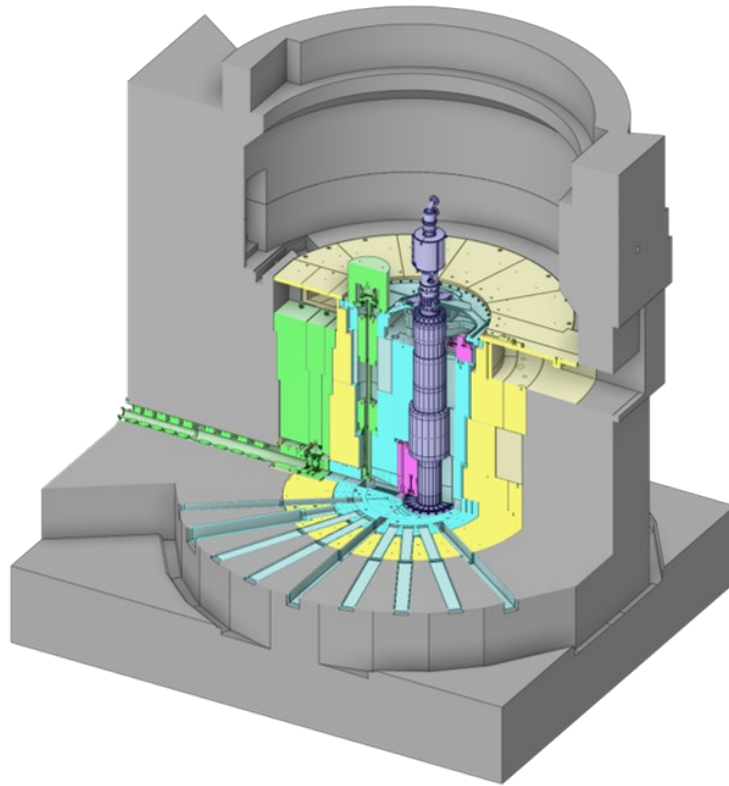


Figure 2 View of Target Assembly installed immediately after rigging into the core vessel

5. ALIGNMENT APPROACH

Once the target shaft and drive assembly has been placed upon the support provided by the core vessel lid, the system must be aligned to STS world-center before being doweled into position. The target assembly will have a point cloud that was generated while the system was in the assembly test stand. The installation team will relate the target assembly coordinate system to the fiducial pin nests located on the drive housing. The drive housing will remain visible to the building fiducial network once all of the segments have been installed and will also be visible while the system is operational.

The drive housing will mate to the core vessel lid by a series of structural bolts and shim stacks. The drive housing has a series of threaded holes that can be used with pusher blocks to finely adjust (push or pull) the attitude of the drive housing prior to securing the structural bolts. The pusher blocks will be removed immediately after the structural fasteners have been fully torqued.

Upon torquing of the bolts, the location of the target coordinate system will be verified one final time using the drive fiducial network. Once the location has been confirmed, two dowel pin holes will be drilled in-situ between the drive housing and the core vessel lid. This match drilling will ensure that the drive housing can be repeatably located in the unlikely event removal is required. Additionally, the shim stack will be recorded at each location.

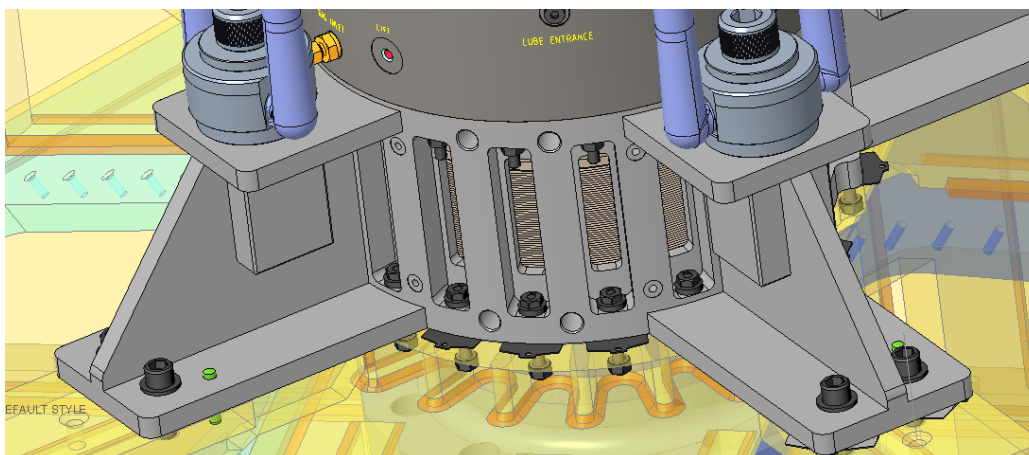


Figure 3. Installation features on Target Drive.

6. ANCILLARY SERVICES

Once the shaft and drive have been positioned and secured to the core vessel lid, the ancillary services of the drive can be connected in their final configuration. This includes the following:

- **Seal purge and monitoring system** – Tubing for the seal purge gas shall be connected to the drive from the core vessel lid bulkhead penetrations
- **Rotation Sensor** – The sensor for detecting the speed of rotation and segment presence will be connected to the Target Protection System. (Note the scope of TPS includes the design and installation of wiring and conduit to the sensor location). The installation of the conduit is anticipated to be completed prior to the target assembly installation but may be completed afterward.
- **Miscellaneous instrumentation:** The wiring for bearing temperature measurement, vibration monitors, or other stationary devices may be routed at this time.
- **Process water** – The process water system can be connected to the top of the drive valve assembly.

7. SEGMENT INSTALLATION

The segments shall be lowered into position in the same manner as described in (Laboratory, Target Assembly Maintenance Manual). Each segment will be loaded into position through the opening in the shield blocks, just downstream of the target.

The locations of the segments on the target drive must be noted on the installation and configuration record.

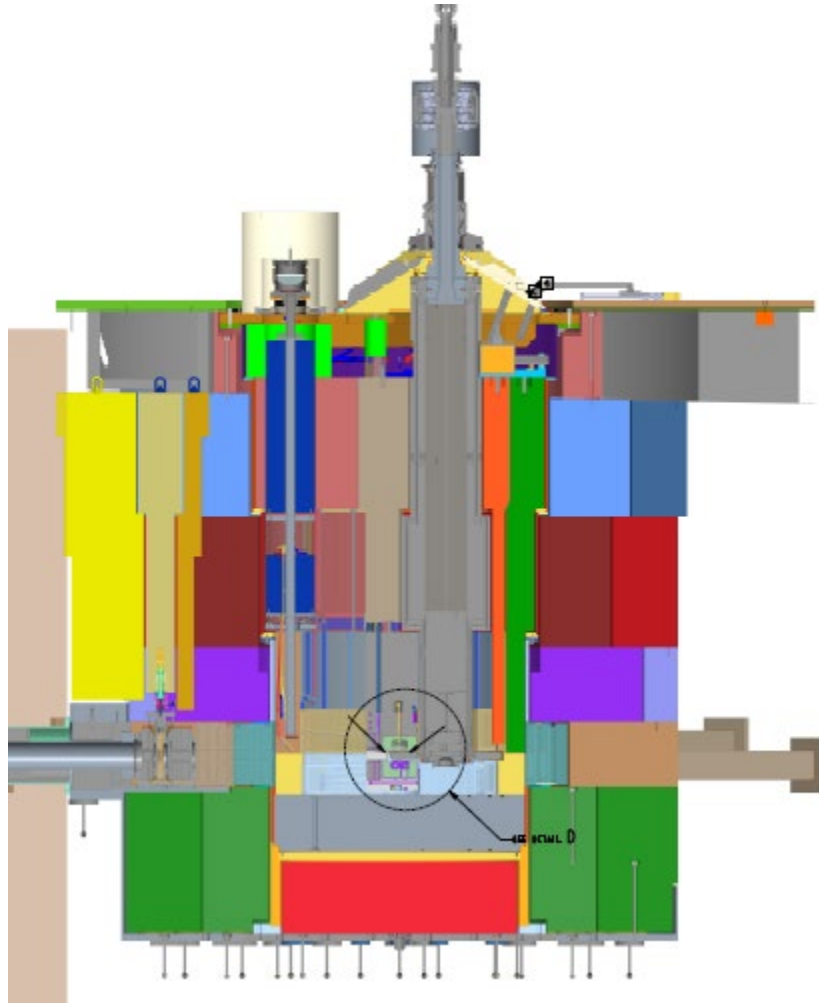


Figure 4. Complete target assembly installation

8. IN-SITU VERIFICATIONS

The following verifications are important to highlight as a subset of the tests contained in (Laboratory, System Verification Plan, 2023).

8.1 LEAK DOWN TEST

Once all the segments have been installed, a system leak down test will be carried out to ensure that the segments, water valves, or connections are leak tight. This will be accomplished by means of leak down pressure test and visual inspection.

8.2 ROTATION

The system shall be manually rotated prior to connecting the drive electronics. Operator feel should verify that there is no binding or contact within the core vessel

8.3 MRA CLEARANCE CHECK

As a final means of verification of the relative position between the target and the MRA, a piece of clay (contained in a bag or foil) will be attached to a target segment and rotated between the MRA. The clay or putty will deform to the clearance between the two objects. This spacing can be measured once the target has rotated into the maintenance keyhole.