

Reactor Vessel Internals Lifting Rig – Replacement or Upgrades

Background

Since the original reactor vessel (RV) internals lifting rig supply, Westinghouse, as the original equipment manufacturer, has developed the design to improve function and reliability, including rotolock engagement, integral operating tools and use of platforms. In addition, portions that are routinely under water are now manufactured with stainless steel. Thus, modern RV internals lifting rigs incorporate proven features that greatly facilitate engagement and lifting of the internals packages.

Reasons for replacing old lifting rigs might include difficulties with testing efforts, past damage to the coupling mechanism and the need for readjustment.

Description

Replacement Lifting Rig

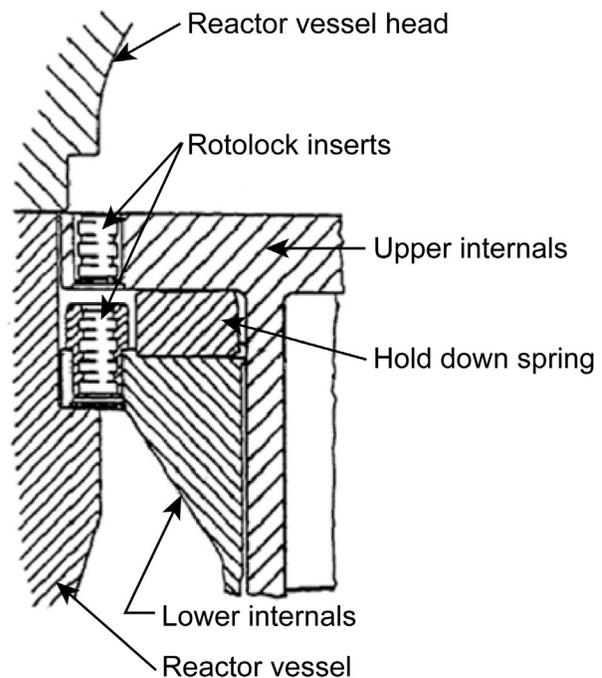
If a replacement lifting rig is required, the project scope will include hardware design, manufacturing, transporting, installing and testing of a new lifting rig, and the dismantling of the old one as an option.

Westinghouse will first perform a field measurement walkdown at the site to support the lifting rig upgrade, which will be completed prior to the installation outage.

Rotolock Backfit

If a rotolock backfit project is desired, the rotolock engagement device consists of a rotolock stud and a rotolock insert. In this case, the rotolock stud is incorporated via a modification of the RV internals lifting rig leg. The three corresponding rotolock inserts are installed in the existing threaded holes in both the upper and lower RV internals flanges.

The device, a stud and insert pair, resembles a breech lock of a cannon. The stud has a cylindrical head and shank. Several rows of lands, or teeth, are spaced at 60-degree intervals around the stud shank. The insert is a hollow cylinder that has several rows of grooves that match the stud lands and are similarly arranged around its inside diameter. The outer surface of the insert is threaded with conventional V threads and screws into the existing threaded holes in the flange of both RV internals assemblies. As a modification, three new rotolock studs are designed into the RV internals lifting rig legs, and respectively, three matched inserts are installed in the existing lifting holes in both the upper and lower RV internals assemblies as shown in the following graphic.



Rotolock backfit

Design Change Package

Westinghouse can also develop a design change package detailing the engineering design and documentation changes in accordance with applicable customer standard quality programs and administrative procedures.

Benefits

A new lifting rig greatly improves ease of handling, provides safety and reliability of operation, and reduces effort involved in periodic testing. The new design includes a locking mechanism allowing for the quick assembly or disassembly, thus providing for easier repair and inspection. The conceptual design of the lifting rig may be adapted to all kinds of lifting devices or to field service tools.

Key benefits of a replacement lifting rig include:

- Stainless steel construction for all sections to be stored underwater for extended periods
- Operator platforms for all three out-of-water pickups
- Design within stress limits of American National Standards Institute (ANSI) N14.6:
 - Stress for three times the weight less than yield
 - Stress for five times the weight less than ultimate
- Design within stress limits of American Society of Mechanical Engineers (ASME) Appendix XVII (equivalent to American Institute of Steel Construction code) for lower internals lift and ASME-BTH-1-2008 requirements (no NUREG-0612/ANSI N14.6 considerations)
- One-third-turn rotolock inserts for ease of engagement, including locking features

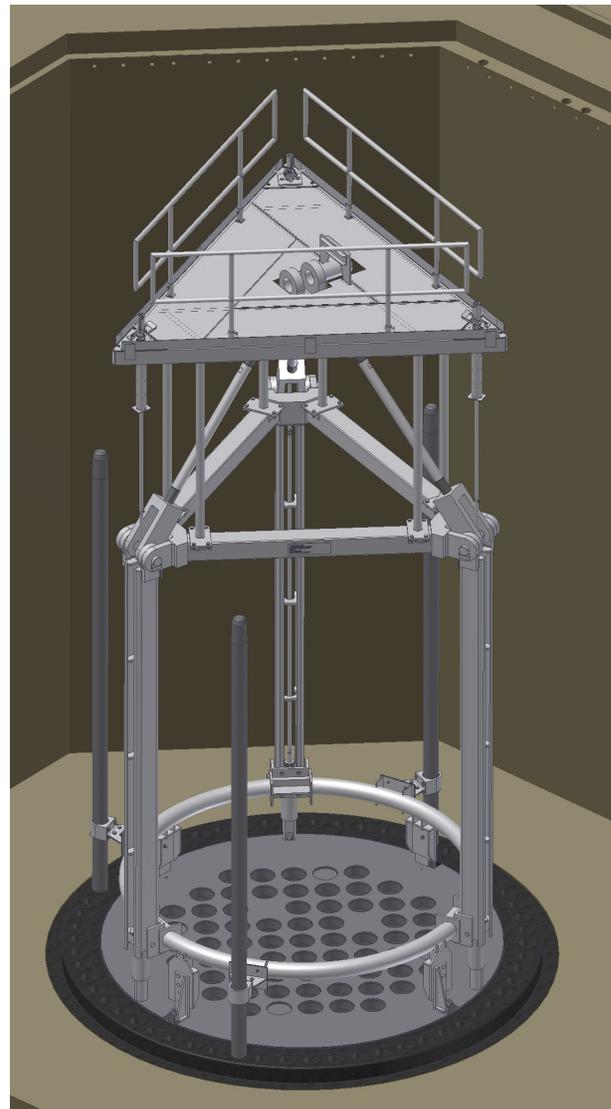
Key features of a rotolock backfit are:

- Simpler engagement of the rig to the internals packages. An indicator at the top of the rod shows the stud is down, rotated and locked to the insert
- Disengagement of the lifting rig is just as simple as engagement
- Due to more sophisticated interface geometry between the mating parts, engagement can accommodate more misalignment than with threaded lifting screws

Experience

Westinghouse is providing a newly designed, stainless steel lifting rig for a plant in the United States, as shown in the following graphic. In addition, there are approximately 30 lifting rigs in use that incorporate the rotolock engagement devices.

Westinghouse has proven its commitment to seamlessly integrating lifting rig services into a plant's outage schedule and performing the work in a professional manner, whether providing headquarters support or work in containment.



New lifting rig