

Reactor Vessel Stud Enclosure

Background

Current practice during an outage requires that the reactor pressure vessel (RPV) studs be removed, cleaned, re-lubricated and the stud holes cleaned free of excess lubricant. The vessel head is not lifted until the studs have been removed and the holes capped. With the use of conventional lubricants, all of the above are necessary and standard procedures for stud and stud hole maintenance. The emergence of PlasmaBond® has changed this standard and created possible alternatives to these otherwise required steps. PlasmaBond has made it possible to leave the RPV studs in the vessel for a longer duration because of its effectiveness in mitigating galling. With the use of PlasmaBond, the studs and stud holes no longer need to be cleaned, saving time and as-low-as-reasonably-achievable (ALARA) exposure levels during outages. To fully realize this potential, a system was developed to encapsulate the stud to protect it from the corrosive capabilities of borated water while the cavity is flooded during refueling operations.

Description

The reactor vessel stud enclosure was designed to enable RPV studs to remain in the flange during the refueling process. The system completely envelops the stud, which is sealed airtight against the reactor vessel flange. The enclosure is made of fiberglass and weighs approximately 10 pounds. The enclosure is designed to be installed before the head is removed. The system is pressurized via the air valve, which is on the top of the system. The system is retained with a screw that has an O-ring seal to protect against pressure loss and potential water leakage during refueling operations.



The reactor vessel stud enclosure installed over a stud in the reactor mock-up at Waltz Mill

Benefits

This new development creates the potential to save time and ALARA by:

- Eliminating the necessity of removing all the studs during refueling
- Minimizing the potential for stuck studs
- Reducing manpower and exposure by eliminating the need to clean studs and stud holes

In combination with PlasmaBond lubricant, the stud enclosure system provides a safe and effective way to reduce costs.