

Steam Generator Secondary Side Water Lancing

Background

As secondary water flows through recirculating steam generators (SGs), it carries with it trace amounts of corrosion products. Over time, these corrosion products are deposited as sludge and scale. If not removed on a regular basis, the deposits accumulate and the buildup can result in pitting, stress corrosion cracking, intergranular attack and other forms of tube degradation. This degradation compromises the longevity and integrity of the tubing as well as the efficiency of the SGs. Removing the sludge on a regular basis maximizes the life and efficiency of SGs, keeping them in optimal operating condition.

Description

Sludge lancing systems use high-volume water jets to remove sludge deposits from the SG tubesheet. The nozzle jets spray water between the tube gaps along the tubesheet surface to flush loose sludge out to the SG annulus. From there, peripheral flow flushing in combination with suction removes the sludge and water slurry from the SG. The slurry is pumped to a filter station where the sludge is removed and the water is recirculated through the system for lancing. This approach promotes water conservation and reduces environmental impact.

Westinghouse sludge lancing systems effectively and efficiently remove accumulated sludge on tubesheet surfaces for both square and triangular-pitched SGs. With more than 30 years of sludge lancing design and operations experience, Westinghouse offers proven solutions for a broad range of site conditions.

Westinghouse has the capability to execute sludge lance cleaning using the following:

- **Automated Software:** This software allows for precision computer-based motion control of the indexing and oscillation functions while executing customer lancing plans. Software controls the time spent in each location of the generator to optimize cleaning effectiveness and duration.
- **Standard or In-containment Delivery Systems:** Westinghouse's standard delivery system is set up within 100 to 300 feet of containment penetration. This approach minimizes space requirements inside containment and reduces employee exposure. For customers with sufficient space inside containment, Westinghouse can also perform sludge lancing using its in-containment system. This system utilizes less equipment and is fully within the confines of containment. Therefore, the need for penetrations and transference of water outside containment during operations is eliminated.

- Customized Cleaning Nozzles: Westinghouse can sludge lance from the tubelane or the annulus. It can lance along columns, rows and in-bundle. Lancing equipment is installed via handholes as small as two inches and tube lance clearances as small as three-quarters of an inch. In addition, Westinghouse has customized nozzles that allow for cleaning in hard-to-reach places such as beneath the blowdown pipes.
- Cleaning Jets: Westinghouse uses customized jets that deliver enhanced water stream concentration and cleaning power. The moveable lancing head provides collimated streams of fluid at high pressure and constant velocity across the tubesheet as each tube gap is indexed. Nozzle heads typically contain between four to eight jets, providing broad coverage with each cleaning pass.

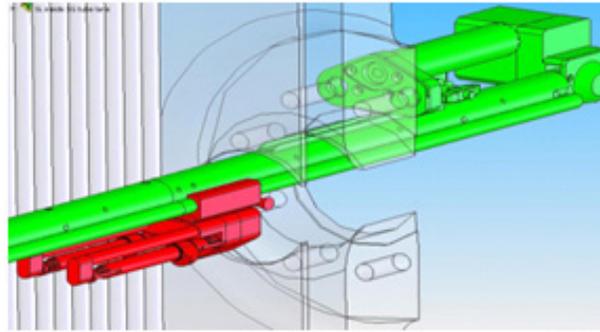
Westinghouse specializes in custom design to meet unique plant configurations and cleaning needs. Technologies such as Hammerhead, Mini-Lance and ScaleBlaster® with flow straighteners are a few examples of how Westinghouse meets unique customer needs.

Benefits

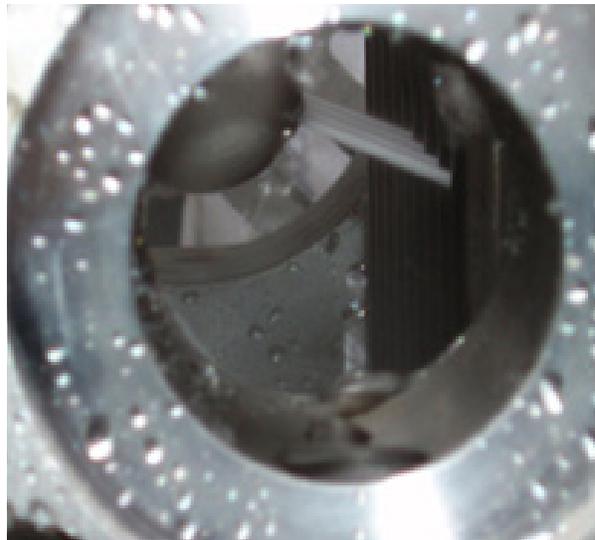
- No compromise to tube integrity
- Reduced lancing and outage times with contour lancing programs
- Limited personnel exposure and improved as low as reasonably achievable (ALARA) goals through remote operation
- Reduced stay times in containment with single-tool-use systems
- Reduced real estate in the protected area and in containment
- Water conservation via filtration, recycling and returning to customer for reuse

Experience

Westinghouse is the world's leading supplier of sludge lance services, with more than 30 years of service to customers throughout 10 countries and leading the way with emerging technologies.



Westinghouse Ultra Sludge Lance System



Westinghouse flow straighteners jets



Westinghouse modular pumping system

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