

The CCTV system provides two different views of the tripper floor: a wide-angle perspective and a narrower one that shows the belt in front of and behind the tripper. Both enable operators to monitor the entire floor to be sure that no spillage or other emergency situations are occurring.

The tripper upgrade project also addressed safety issues related to the upgrading of e-stop and position over-travel systems and the previous lack of audible warnings of system starts. The continuous monitoring of bunker levels and the flow of coal in chutes (at two points) minimizes nuisance plugging alarms and associated belt tripping. The system's logic provides automatic clearing when blockage of the floor grating occurs. Meanwhile, the laser-based tripper positioning system also detects unexpected tripper movement, preventing potential system damage. Finally, the PLC notifies the operator when actions need to be taken at the tripper and/or the feeders to maintain system throughput.

**WATER TREATMENT**

**Maximize membrane life**

The life of demineralizer vessel linings can be significantly extended with the proper combination of in-house examinations and regular inspections by a certified rubber lining technician. In an effort to save money, O&M crews are relying solely on visual inspection of their rubber-lined demineralizer vessels. Without the right tools and experience, you're probably not getting an accurate assessment of the long-term integrity of your linings (Figure 4).

To extend the life of a lining, the first step you should take is to open the manway during an outage and visu-



**4. Pay me now, or pay me later.**

Routine maintenance of rubber-lined demineralizer vessels extends their life and avoids the high cost of replacement. Proper inspections require specialized training and tools. *Courtesy: Corrosion Technologies Inc.*

ally check the lining to confirm that rubber remains bonded to it, with no cracks or tears. Pay particular attention to 90-degree corners and high-stress areas. Always replace the gasket after each inspection and remember that the rubber lining is not a substitute for new gasket material.

The next step is to visually inspect the entire lining to make sure that the rubber appears pliable. If the lining looks spongy or blistered, it has probably absorbed some demin solution and needs to be repaired. If any blisters have ruptured, it's a good bet that the steel tank's sidewalls have been exposed to liquids and that a more extensive investigation is called for. Another indication of a liner problem is calcium scale buildup on sidewalls (Figure 5).

Rubber-lined demineralizer vessels can maintain their integrity for 20 years—but only if the linings have been properly cared for. Two elements of such a maintenance program are Durometer testing and spark testing.

After a rubber lining is vulcanized, it is immediately tested by a Durometer (to ensure that the lining is fully cured) and the results are published. If a subsequent Durometer test of a used lining by a properly trained technician produces a reading that differs significantly from the published figure, the lining may be experiencing excessive wear.

By contrast, spark testing is more of an art than a science. But it requires just as much care. For example, the technician must be careful not to create pinholes in the rubber in the process of testing it. And the spark-testing equipment must be calibrated before each inspection. If it is not, a metal-lined plate with a lining thickness equal to that of the liner being tested is required as a control.



**5. Age gauge.** If the results of a Durometer test of a used lining differ significantly from those of its factory test, it's likely that the lining has lost mechanical integrity. *Courtesy: Corrosion Technologies Inc.*

The probe used in spark testing also is very important. Wands should be "L" shaped and measure 12 inches on each side. The tip should always be turned up to eliminate end discharges. Although a wand probe is usually chosen, a fan probe may be appropriate for testing intricate parts. In either case, the probe must be passed over the rubber in a continuous sweeping stroke, making sure not to stop or concentrate on any one area. An inconsistent motion could burn the lining or leave marks if the probe is left in one place for too long.

It is also important to make sure that spark voltage settings are proportional to the thickness of the lining. Typically:

- 1/8-in.-thick rubber requires 6,250 to 8,500 volts minimum.
- 3/16-in.-thick rubber requires 10,000 to 12,500 volts minimum.
- 1/4-in.-thick rubber requires 12,500 to 15,000 volts minimum.

Spark testing should only be done when considered necessary and by a certified rubber lining technician. Too-frequent testing often leads to excessive repair needs, especially for vessels that have been in service for several years and have lost electrical resistance. Possible reasons for this loss include the penetration of the lining by demin solution or saturation of the surface by salts. Finally, cracks in linings usually manifest by a loss of gauge in the cracked area.

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**MECHANICAL**

**Top 10 ways to keep HRSGs squeaky clean**

A heat-recovery steam generator (HRSG) enables a combined-cycle power plant to be more efficient than a plant powered by a steam or a gas turbine alone. But the tremendous volume of water passing through the typical HRSG day after day all but guarantees that the unit will soon become dirty and lose some of its efficiency. After a few years of service, every HRSG (Figure 6) deserves a good waterside cleaning. Following are 10 guidelines that can help make cleaning projects more effective.

**1. Establish the unit's condition.** Typical areas of concern here include how the HRSG's components have been stored and if preservatives or coatings