Insertable Smelt Spouts

The design, installation and maintenance of smelt spouts, used to discharge liquid smelt from the furnace to the dissolving tank, are important to the safe, reliable operation of Kraft recovery boilers. To address the explosive nature of smelt-water interactions and the extreme temperature of the molten smelt, spouts are typically water cooled using a closed system to maintain high-quality water and avoid deposits in the spout water jacket. Spouts can broadly be described as either a flush-mounted assembly or insertable spout design.

Flush-mounted spouts have a machined face on the furnace end that "nests" with a flat surface, an alloy plate or cast washer on the spout opening. The smelt entering the flush-mounted spouts flows across the spout opening tube surface for composite or weld overlayed spout opening tubes. In carbon steel spout openings, an assembly of stacked studs protect the tube.

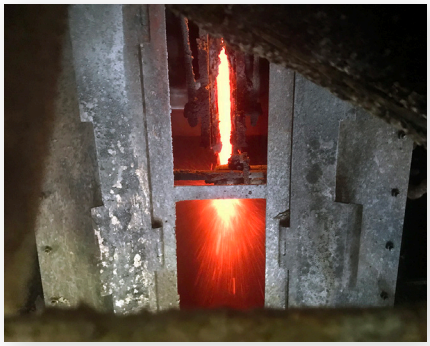
Insertable spouts are shaped with the furnace end extending to the crown of the spout opening wall tubes. The smelt entering the spout flows past but not over the smelt opening tubes into the spout. These tubes require corrosion protection similar to the rest of the lower furnace for resistance to wastage.

Innovation

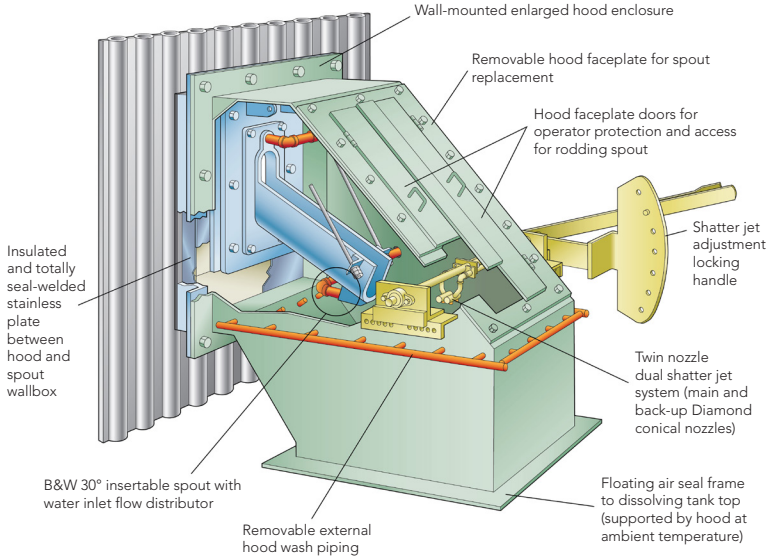
Since supplying the first Kraft recovery boiler in 1929, Babcock & Wilcox (B&W) has led the development of many improvements in safer, longer-lasting operation of smelt spout systems.

Our latest innovation is a new, boiler wall-mounted hood enclosure design. It is available for our 15- and 30-degree insertable spouts and incorporates a hood-mounted optimally positioned shatter jet assembly. The shatter jet nozzles are adjustable in a pinned assembly to allow for fore and aft and tilt movement/position for optimum smelt shattering.

B&W's 30-degree spout and shatter jet design has been proven to safely and reliably optimize smelt shattering ▶



B&W's Insertable Spout and Hood Design



Design features

- Hood is supported from furnace wall
- Floating seal at dissolving tank extension neck
- Removable front plate for access to smelt spout without removing the entire hood enclosure
- Low-profile shatter jet assembly to adjust angles for optimum smelt shattering
- Dual shatter jet design accommodates primary and backup on same support
- External wall wash piping to distribute weak wash flow down the inside hood wall to prevent deposits. Wall wash headers are externally removable for safe adjustment, replacement and cleaning plugged nozzles.

continued ▶

Benefits

- Helps to reduce maintenance time and costs
- Improved access around spout deck
- Improved shattering during heavy smelt flows, surging or flow imbalances
- Increased safety for personnel in the area
- Reduced noise
- Reduced shatter jet steam supply requirements with effective smelt shattering
- Minimized modifications to existing equipment
- Decreased fume and excess loading on vent stack scrubber
- Reduced wear on hoods with improved structural integrity of hoods and tank extensions
- Replaceable hood wash nozzles to adjust weak wash hood wall coverage and flow rate

Fabrication

The typical material for spout fabrication is carbon steel plate and tubing. Spouts operate with a minimum of 150F (66C) inlet water temperature to avoid corrosion wastage. Flow rates from 20 to 60 gpm (1.3 to 3.8 l/s), produce an outlet water temperature no greater than 190F (88C) to avoid excessive steam bubble formation in the cooling water jacket. Carbon steel construction has proven to provide maximum thermal fatique resistance, contributing to the formation of a protective frozen layer of smelt on the trough where smelt is flowing. Weld overlay on trough or chromized spouts can be provided to address specific wastage and corrosion problems.

Replacement

In its Safe Firing of Black Liquor Guidelines, the Black Liquor Recovery Boiler Advisory Committee (BLRBAC) recommends the replacement of spouts every 12 months. With B&W's special corrosion-resistant features, insurance inspectors at many mills have supported the extension of spout replacement well beyond 12 months based on inspection experience and empirical performance.

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