

Experiences with On-Line Explosive De-Slagging at Covanta WTE Facilities

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An on-line cleaning technique perfected in Europe, which places low-yield explosive charges in close proximity to tube lane pluggage, and uses pre- and post-cleaning video camera surveillance to document results, has been tested at three WTE facilities in the western U.S. operated by Covanta. Testing indicates several tangible benefits relative to the more traditional off-line blasting, water washing (on-line and off-line), and stick blasting (on-line), including:

- substantial elimination of cleaning related downtime between maintenance outages;
- longer run times with less overall fouling and pluggage related ailments;
- reduced off-line cleaning time at the beginning of major outages to the benefit of the outage schedule;
- exemplary safety of the on-line cleaning process;
- less wear and tear on pressure parts and boiler casings; and,
- almost no fugitive dust problems in the boiler house that may occur with off-line blasting.

The process starts with an initial video survey of fouling conditions. A water-cooled camera with purge air and temperature monitoring is inserted into the flue gas to record the fouling condition of the boiler. Following the survey, a cleaning plan is developed. Shots consist of low-yield detonating cord encased in thin gage aluminum alloy tubing. The charges are positioned in the gas lanes between tubes while being cooled with a water-air mixture, and detonated. Following the cleaning effort, a final camera survey is done to verify the cleaning effectiveness, and to follow up with touch-up cleaning if necessary.

While a considerable effort may be necessary to provide adequate access and to determine the optimal interval between cleanings, significant improvements in cleaning effectiveness and availability have been seen at some facilities.

Introduction & Background

U.S. municipal waste-to-energy (WTE) facilities operate using a number of different economic models, with the majority incorporating built-in incentives to maximize waste processing capacity. Facility operators seek to maximize throughput rates to their practical limits, reducing both scheduled and unscheduled downtime so that more hours per contract period can be spent at those throughput rates, to capitalize on these incentives.

Combustion of municipal solid waste generates significant fouling of boiler convection surfaces over time, which if left to build up can result in a number of detrimental consequences including reduced processing capacity. Cleaning methods currently employed in the U.S. inevitably require downtime to deal with the fouling and its consequences.

The most prevalent cleaning methods used today include off-line explosive cleaning (dynamite and detonation cord, or “det-cord”) and medium and high pressure water washing. Covanta’s WTE facilities use both of these approaches, with explosive cleaning the most common.

Explosive cleaning uses shock waves to remove slag buildup from tube banks, while water washing relies on high velocity jets to scour the slag off the tubes. Some on-line explosive cleaning has also been tried at a few Covanta facilities. This typically involves detonating a water-cooled “stick charge” of dynamite along the front or rear face of a tube bank. The size of the charge is necessarily large in order for the concussive force of the blast to penetrate beyond the face of the tube bank and clean an area covering multiple lanes. Tube shield and support bracket damage is common when this is done.