

WATERWALL CORROSION PREVENTION EXPERIENCE AT THE COMMERCE REFUSE TO ENERGY FACILITY

JOE SMISKO

Commerce Refuse to Energy Facility
Commerce, California

Discussion by

John W. Norton
Dayton, Ohio

Considering all the downtime and maintenance costs associated with their use of "V" anchors and refractory, studs and refractory, refractory blocks, and 625 alloy overlay for waterwall protection, "Is it still worthwhile from any prospective to have waterwalls so near the combustion zone?"

Removing the first waterwall surface areas from the combustion zone will not eliminate surface wastage, however, as our experience in Dayton has shown. In Dayton, even though waterwalls are removed from the combustion zone and used to buffer extremes of temperature in a "waste heat recovery" position down-stream from the flame front, tube wastage requiring Alloy 625 weld metal overlay has been the experience.

AUTHOR'S REPLY

Mr. Norton makes a good point: if the lower combustion zone is giving a lot of problems with the waterwalls, why not eliminate the waterwalls in it altogether? I believe, however, that the waterwall in the lower furnace is still the better of two evils. This is based on three premises:

(a) The lower 10 ft of side walls has a lower corrosion rate than the 10–35 ft zone (this can be inferred from Table 1 of the paper with an overlay life of 120 months for the lower 10 ft zone vs 96 months for the 10–35 ft zone).

(b) Above the 10-ft elevation, the corrosion rate for the waterwalls is mainly temperature dependent and thus decreasing with elevation as the waterwalls pull out the heat.

(c) A refractory wall does not pull much heat from the flue gas (i.e., the wall is a good insulator).

Given the first premise, the refractory section would have to be 20–40 ft high to "protect" the high corrosion zone. Given the second and third premises, however, the refractory wall would simply raise the temperature gradient so that the lowest waterwall tube above the refractory would be the same temperature as the lowest tube of a full waterwall furnace. This would result in the same corrosion rate, even though it would be at a higher elevation. In addition, because the refractory wall "uses up" elevation without reducing the temperature, the entire furnace would have to be taller or larger to maintain the same superheater flue gas inlet temperature.

It is my understanding that another disadvantage of a refractory only wall is that it can build up a thick slag layer because the surface is hot. The slag can eventually impede refuse flow. A waterwall, even with a thin layer of refractory, tends to stay cool and resist slag build up.