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INDUSTRY NEWS

Airheater Inefficiency: Why Antiquated Technology is Costing Your Plant Millions of Dollars Annually

Some Energy Suppliers Are Now Using High-Performance Seals Technology to Stop the Bleeding - by Jim McMahon



September 28, 2006 -Any smart executive would agree that investing \$50,000 to save \$1,000,000 in plant maintenance costs is a smart decision. However, every day a power plant is doing just the opposite when it comes to maintenance on their airheater, and odds are that a similar situation is happening in your plant too. Most power suppliers are losing millions of dollars annually because they continue to purchase antiquated technology for their airheaters, when high-performance products are available – high-performance seals, for example, that can reduce leakage in airheaters by 50%, reduce fuel usage by 1%, and increase boiler efficiency by at least 1%, thereby increasing overall airheater efficiency by as much as 50%.

Compounding the airheater problem is the inefficient solution of adding more fans to pump more air through, instead of dealing with the leakage problem itself. By simply putting into place the latest high-performance seal technology, a larger plant can easily increase their actual output by 2 to 3 megawatts - during the peak summer months that can equate to \$3,000 an hour, or more, in additional revenue. In addition, plants that are load limited during hot summer months can further increase their output by 20 MW or more, adding additional revenue of approximately \$20,000 per hour during peak periods.

There is a catch: to conserve these mega-bucks on the back end, power suppliers have to invest a bit more on the front end for the superior, high-performance seals, and some facilities have been reluctant to make the move. But for those that have, such as Duke Energy, Southern California Edison, AEP, Southern Company, TXU, Reliant Energy and others, the benefits are clearly showing up on the plus side of their financials.

With the increase in the price of fuel, pollution constraints, demand for power, as well as the fact that shareholders of publicly traded plants are demanding a higher return on investment, it is becoming apparent that plant managers must decrease inefficiencies and reduce downtime of the plant. Many people do not realize that the airheater is one of the most important contributors to a plant's thermal efficiency, accounting for roughly 25% of total boiler effectiveness. For any top-level power industry executive, this issue of high-performance seals certainly warrants immediate attention, as its financial rewards are quite considerable.

Airheaters are used in most steam generating plants to heat the combustion air and enhance the combustion process. They act as a heat trap that collects and uses waste heat from the flu gas stream, which increases boiler efficiency by as much as 25%. Airheaters capture and recycle about 25% of the heat energy exiting the boiler. For example, in a 500 MW coal-fired plant the recycled energy amounts to about 1.5 billion BTUs per hour, and reusing it reduces coal consumption by about 1,500 tons per day.

Here are 4 facts that you need to be keenly aware of in order to re-capture some of the losses incurred by an inefficient airheater:

**Fact #1:
Airheater Inefficiency Will Cost You
More Money on Downstream Equipment**

Most power company executives are unaware of the extent of their airheater performance problems, and the widespread impact it has on their entire plant operation and efficiency. Some issues that arise are the negative effects caused downstream on pollution control equipment - i.e. baghouses, electrostatic precipitators and scrubbers - which reduces the performance on the equipment throughout the draft system, not to mention on the FD/ID fans, motor drives and booster fans.

Traditional, standard airheater seals are a single strip of 12 to 16-gauge carbon steel placed ¼" to ½" away from the sealing surface. The problem is that they do not seal tightly and are frequently blown open

or damaged by the high differential pressures produced by the air pollution control equipment downstream. Before the advent of high-tech downstream components, standard-type seals were somewhat sufficient for the job, but that is no longer the case.

Poorly performing airheater seals negatively affect the operation of these components, causing a decrease in the collection efficiency of downstream air pollution control equipment, increasing APC operating and maintenance costs, and increasing the likelihood of non-compliance violations.

**Fact #2:
Using Additional Fans in Place of High-Performance Seals
Will Not Increase Your Energy Revenue**

The fan motors are one of the largest electricity users in your plant, and seal leakage can account for as much as 25% of total fan horsepower. The wasted revenue dollars alone associated with this unnecessary internal use of energy is enough to justify the initial cost of high-performance seals several times over during the course of a year. Why not make this energy available for sale instead? And, let us not leave out the additional fuel required to create this wasted fan energy, and its costs. A reduction in airheater leakage is effectively an increase in fan capacity. The dollar savings are substantial to say the least.

**Fact #3:
Excessive Airheater Leakage Will Cut
Your Energy Availability During Peak Loads**

Because of excessive seal leakage, some boilers cannot reach their maximum MW output due to their limitations on fan capacity. This commonly occurs during summer months when hotter, thinner air causes additional strain on fan output. Unfortunately, peak power prices most often occur in the same summer months, which can severely impact revenue.

Updated airheaters typically leak more than 10%, and an airheater that has been in service for more than 10 years can be expected to leak a minimum of 25%, when not using high-performance seals. Most plants have no idea how bad their actual air leakage really is, leakage across radial seals has been measured at over 40% in some plants. Plants lose the opportunity to sell hundreds of megawatt-hours each day due to excessive air heater leakage. During periods of peak demand, the lost revenue can exceed \$100,000 per day.

**Fact #4:
Your Airheater Leakage Can be Reduced by 50%,
With Resultant Revenue Gain, by Using High-Performance Seals**

Airheater leakage can be cut in half in most plants. To achieve this low level of leakage, a revolutionary design of high-performance, self-adjusting seals had to be developed - designs such as radial seals that employ a bellows approach to produce a spring force which keeps the seal in contact with its sealing surface; and, interlocking circumferential seals used on the perimeter of the airheater's rotor, designed to resist the type of leakage suffered by standard-type seals during rotor turndown. These new technological developments in seals were brought forth by a U.S. based manufacturer called Paragon Airheater Technologies, and represent the only significant technical advance in airheater seals technology within the past 80 years.

Despite the small up-front cost of high-performance seals, they deliver a return on investment quickly. When all factors are considered, the use of high-performance seals not only can save your plant millions a year, but make more megawatts available for sale, reduce maintenance costs, and reduce the use of electricity necessitated for operating boiler fans at the higher flow rates.

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