To: Karen Lockhart

From: Lars Andersson

CC:

Date: 9/5/2003

Re: UBC Poster Summary

In January 2001, GE Reuter-Stokes purchased a company formerly known to the industry as MK Engineering, which developed, marketed and installed a suite of Combustion Monitoring Systems for use on fossil fuel boilers (mostly coal). Included in this suite of products are two systems, which can be used to monitor and control the production of Unburned Carbon (UBC) in flyash. These two systems are the LOI Monitoring System and the O2/CO Grid Indicator System. These two systems are intended to provide boiler operators with unique information and insight into the combustion process.

The LOI Monitoring System is a tool, which provides a profile of LOI production across the width of the furnace exit area of a coal-fired boiler. The system is comprised of a row of sensors installed across the furnace exit in line with each burner column. The heart of the sensor is a passive photodiode, which looks at both the average level and fluctuations of light intensity in the viewing area of the sensor. The average level of light intensity is relayed to the operator as a relative indication of brightness or "temperature"; and the fluctuations in light intensity are used to calculate a relative indication of LOI. The purpose of this system is not to provide an absolute measurement of LOI (or UBC), but to provide the operator with a real-time, relative indication of LOI to use while tuning the combustion process.

The O2/CO Grid Indicator System offers the user with a multipoint, in-situ grid of sensors, each providing a real-time indication of O_2, CO and Temperature. The number of points installed in the grid is dictated by the size of the boiler, but have ranged from 8 to 24 points. This system is typically installed in the upper area of the convective pass, in the temperature range of 1000-1200°F, positioning the sensors much closer to the combustion process than traditional O_2 or CO indications. The number and location of points in the grid are chosen such that pockets of incomplete combustion can be traced back to individual burners or groups of burners.

By providing a multipoint, in-situ grid located close to the combustion process the operator gains more resolution on the distribution of O_2, CO and Temperature within the boiler. This system provides immediate feedback during to the operator during manual tuning processes, and the real-time data has proven to be a valuable input to advanced control systems, such as neural networks. This system allows the operator to more closely tune his boiler for low NOx operation while minimizing the amount of UBC in flyash.

These two products used in combination or as stand-alone systems offer the boiler operator a detailed view of the combustion process. With this insight, the operator is able to eliminate local pockets of poor combustion that cause a large portion of the overall emissions and other local boiler problems, such as UBC.

Our poster titled "GE Reuter-Stokes' Combustion Monitoring Systems" will present the application of these two products to boiler balancing and tuning with the purpose of controlling products of incomplete combustion. Included will be graphical descriptions of the products and how these products are applied to a coal-fired boiler.

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