AMC POWER
a division of Air Monitor Corporation

APPLICATION BULLETIN
ICA-02

MEASURING SECONDARY AIRFLOW
(Venturi Replacement)

Problem

The objective in the power industry today is twofold; to lower emissions and increase the plant's performance. Precise control of combustion airflow and fuel rates ensures proper stoichiometric ratios yielding more complete, stable combustion which ultimately has a positive effect on emissions and performance.

In fossil fuel plants designed over the past 40+ years airfoils or venturis have been the standard method for measurement of total secondary airflow. The signal obtained from these airflow measuring devices is used to control and maintain proper air to fuel ratios.

Although both airfoils and venturis have provided adequate airflow measurement in the past, today's emissions standards and performance concerns have prompted plant engineering to seek a more cost effective and accurate means of measurement.

Venturis and airfoils have known limitations: 1) significant nonrecoverable pressure loss means wasted energy or reduced fan capacity, 2) as turndown requirements increase for low NOx retrofits, accuracy decreases, 3) five to eight straight lengths of duct runs are needed at the point of installation to obtain true accuracy and repeatability, 4) the DP outputs are not linear, thus a single "K" factor cannot correct over a broad operating range, and 5) low signal to noise ratios are generated, producing unstable signal outputs.

Solution

AMC Power's Application Engineering Department was called upon by a Utility located in Florida to design a system to replace a venturi within their 300MW gas/oil wall fired boiler.

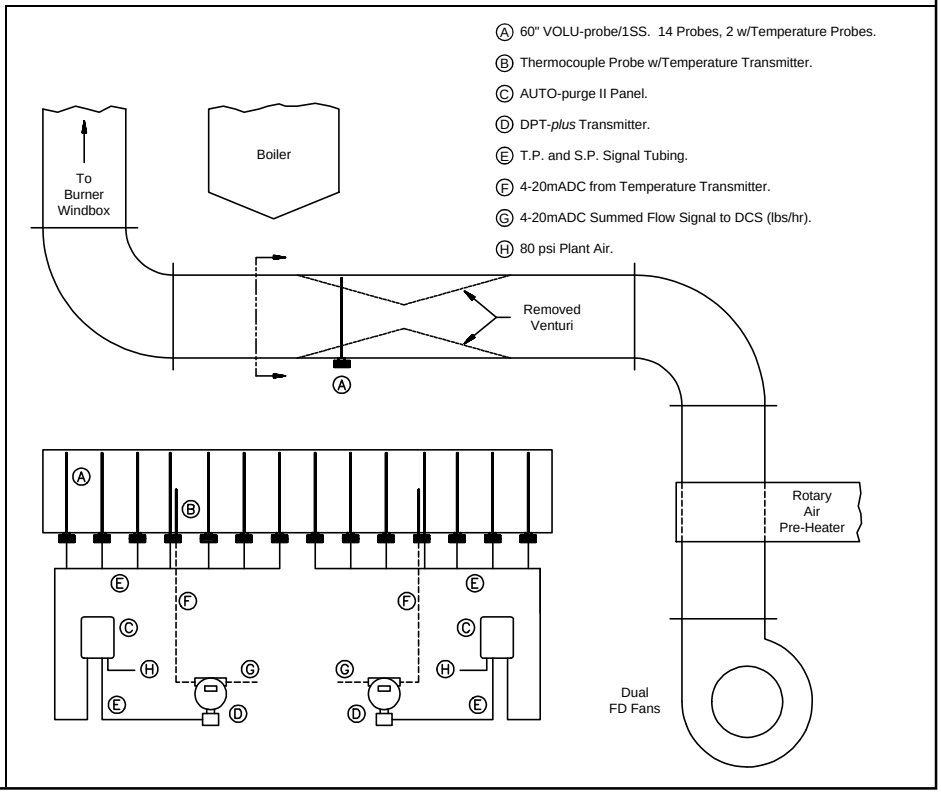
Low NOx burners were to be installed requiring more accurate and linear airflow measurement, greater fan capacity, and higher airflow turndown.

The measuring location was within a 5'h x 75'w x 40'l duct section, downstream of twin forced draft (FD) fans and a rotary air preheater. The fans joined into a common duct prior to the preheater, and it was believed that the flow rates on either side of the duct would vary depending on the load changes on either fan.

Two sets of probe arrays, each having seven 5' long VOLU-probe/1SS Pitot-Fechheimer probes, were installed. Each array's total and static sensing lines were manifolded together and routed through an AUTO-purge Panel to ensure system integrity against particulate buildup, then on to a DPT-*plus* Ultra Low Span, Density Compensating (DP) Transmitter. The 4-20mADC (lbs/hr) signals are forwarded to the DCS.

Results

The installed system achieved the objective of measuring to within 3% of actual flow with turndowns of 4:1, and the system saved over $10,000 per year in reduced energy costs to operate each FD fan. Additionally, due to the systems sensitivity, one of the twelve sections of the rotary air preheaters was found to be plugged. Plant performance was increased.



P.O. Box 6358 ♦ Santa Rosa, CA 95406 ♦ (707) 544-2706 Phone ♦ (707) 526-9970 Fax