



STORM TECHNOLOGIES, INC.

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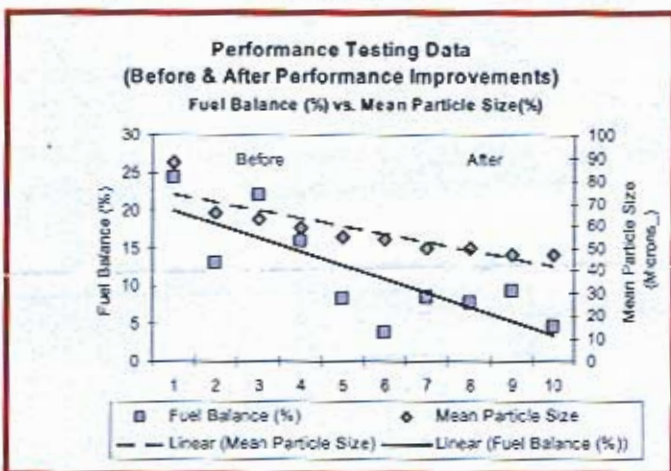
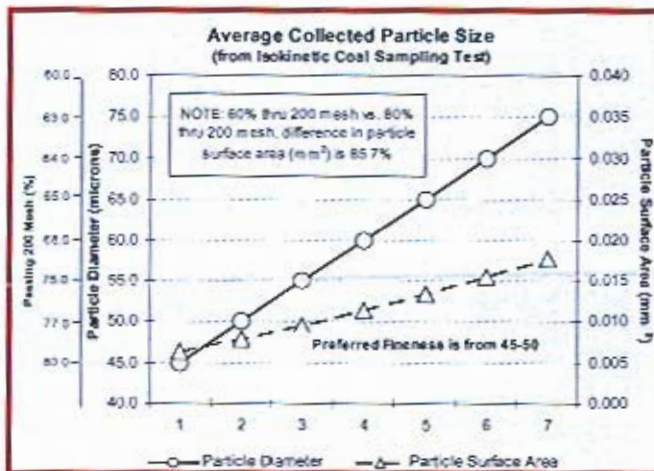
ARE YOU INTERESTED IN OPTIMIZING BOILER PERFORMANCE WITH YOUR EXISTING EQUIPMENT TODAY?

STORM ENGINEERED SOLUTIONS ARE PROVEN BY TESTING!

In today's market, it seems that the fix to everything is to replace key components (i.e. burners, OFA, pulverizers, etc...), with capital expenditures or do nothing. This is apparently because it is easier to obtain "Capital Dollars" than it is "O&M" dollars. The **FUNDAMENTALS** tend to be overlooked, such as; the boilers, pulverizer performance, mechanical tolerances, burner tolerances, air in-leakage, airflow management, etc... Opportunities that can be associated with these include:

- ◆ Slagging and Fouling of the "Back-Pass"
- ◆ High Super-Heat & Re-Heat Spray-Flows
- ◆ High LOI and Poor Heat Rate
- ◆ Excessive Air In-Leakage

From our experience, the majority of these opportunities deal with pulverizer performance & airflow management, which deals with more than 75% of STORM's "*Thirteen Essentials for Optimizing Unit Performance*". So, it has been our experience that pulverizer performance optimization is the first step to a successful combustion optimization program. The inter-relationships of the pulverizers must be considered when attempting to optimize combustion, overall unit performance (including heat-rate), operability, reliability, and capacity. Pulverizer capacity seems to be an industry challenge while many units today are undergoing drastic fuel changes. Considering there seems to be a huge disconnect when correlating mill performance with issues such as fuel distribution, heat-rate, NO_x & environmental control equipment performance, it is the intent of this newsletter to provide a better understanding of how mechanical optimization & tuning of the pulverizers can yield improved performance. The following shows a graphical representation of pre & post pulverizer optimization of poor & good fineness data.



With FALL outages starting soon, it is possible to address these issues with a three-step process - IDENTIFY/IMPLEMENT/QUANTIFY. Testing should be utilized to identify these areas, implement recommendations based on findings and quantify by testing/tuning for performance optimization. As previously discussed above. Pulverizer performance is the number one determinant of optimum furnace performance. In addition, "Pulverizers" comprise 75% of the "*Thirteen Essentials*". The Figures on the following page illustrate STORM recommendations for a complete pulverizer optimization program.

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iii Summary:

Are You Interested in Optimizing Boiler Performance with your Existing Equipment Today?

Everyone is; however STORM takes a different approach by working with the existing equipment and applying engineered solutions. Often, a plant will upgrade burners to obtain lower NOx and emission levels. Sometimes this is NOT a bad idea other than being costly. However, often we have found that with 1st or 2nd generation low NOx burners, they do not necessarily need replaced. By applying improved accuracy and excellence to pulverizer performance, the FUNDAMENTALS as previously noted can significantly impact LOI, fuel line distribution, excess oxygen levels (balancing furnace exit and making lower excess oxygen levels possible), reduce NOx and CO levels, etc... The **RESULTS** of applying STORM's "**Thirteen Essentials**" is time proven and has served our customers well. Applying these have always been the key to unit optimization in a pulverized coal fired unit, no matter the make and kind. In addition to the pulverizer recommendations, the remaining essentials deal with airflow management, mechanical tolerances and reducing air in-leakage. These should be addressed as well during the outage period. As reviewed in our previous newsletter, Why Optimize Combustion? There are at least 15 reasons to optimize combustion, and by the Storm Approach, that means getting the furnace inputs right to achieve the following!

- ◆ Improve fuels flexibility
- ◆ Reduce slagging & fouling (popcorn ash to SCR's)
- ◆ Improve heat rate
- ◆ Reduce flyash unburned carbon
- ◆ Reduce bottom ash carbon content
- ◆ Reduce de-superheating spray water flows to the super-heater and re-heater
- ◆ Reduce water-wall wastage (fire-side)
- ◆ Reduce "Hot-Tube" metal temperatures
- ◆ Increase capacity factor due to fan limitations from too much air in-leakage or too high of draft loss from fouling
- ◆ Reduce CO and NO_x
- ◆ Improve flame stability with low volatile fuels (such as petroleum coke)
- ◆ Improve reliability due to large slag falls and pressure part damage
- ◆ Lower production cost
- ◆ Reduce Greenhouse Gas Emissions

IDENTIFY: Storm Technologies, Inc. conduct a Comprehensive Diagnostic Test.

- The purpose of this is to ascertain and identify what the opportunities are and to quantify them as to how much opportunity they represent. Examples: Coal fineness, coal distribution, air in-leakage, high primary airflows, airflow imbalances, etc.

IMPLEMENT: Apply "Performance Driven Maintenance".

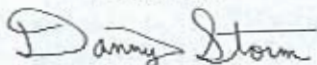
- This includes previous recommendations for pulverizer performance, accurate airflow measuring elements, burner mechanical tolerances, repair air in-leakage, etc...

QUANTIFY: Storm Technologies, Inc. conduct a Comprehensive Diagnostic Test.

- The purpose of this is to quantify outage work completed and to tune the boiler for optimized NOx, LOI and performance operation.

STORM now has the capabilities to perform the previous recommendations. Storm now has a new fabrication shop to fabricate each of the previous recommendation with the ability to control costs on expedited components as needed. ***So, it is not too soon to review your performance and provide these components this outage if you are interested in getting the most of your existing equipment!*** We are interested in obtaining RESULTS with your existing boiler equipment. Many of our publications are posted on our web page, which you can find at www.stormeng.com. Of course, feel free to call for further information on how combining your resources with Storm's can yield **RESULTS**.

Yours Very Truly,



Danny Storm
Consultant

NEW - FABRICATION CAPABILITIES - NEW STORM TECHNOLOGIES, INC.

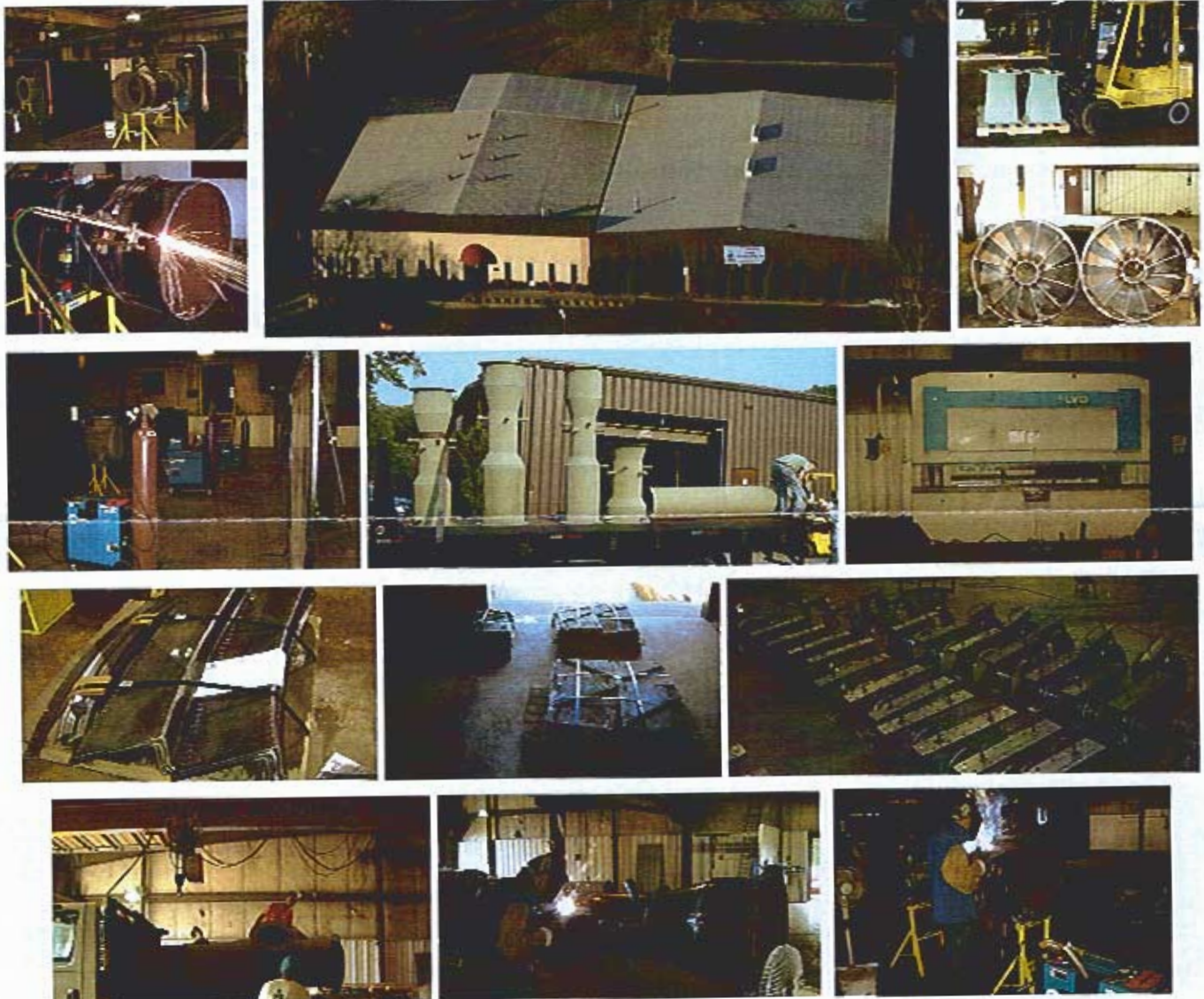
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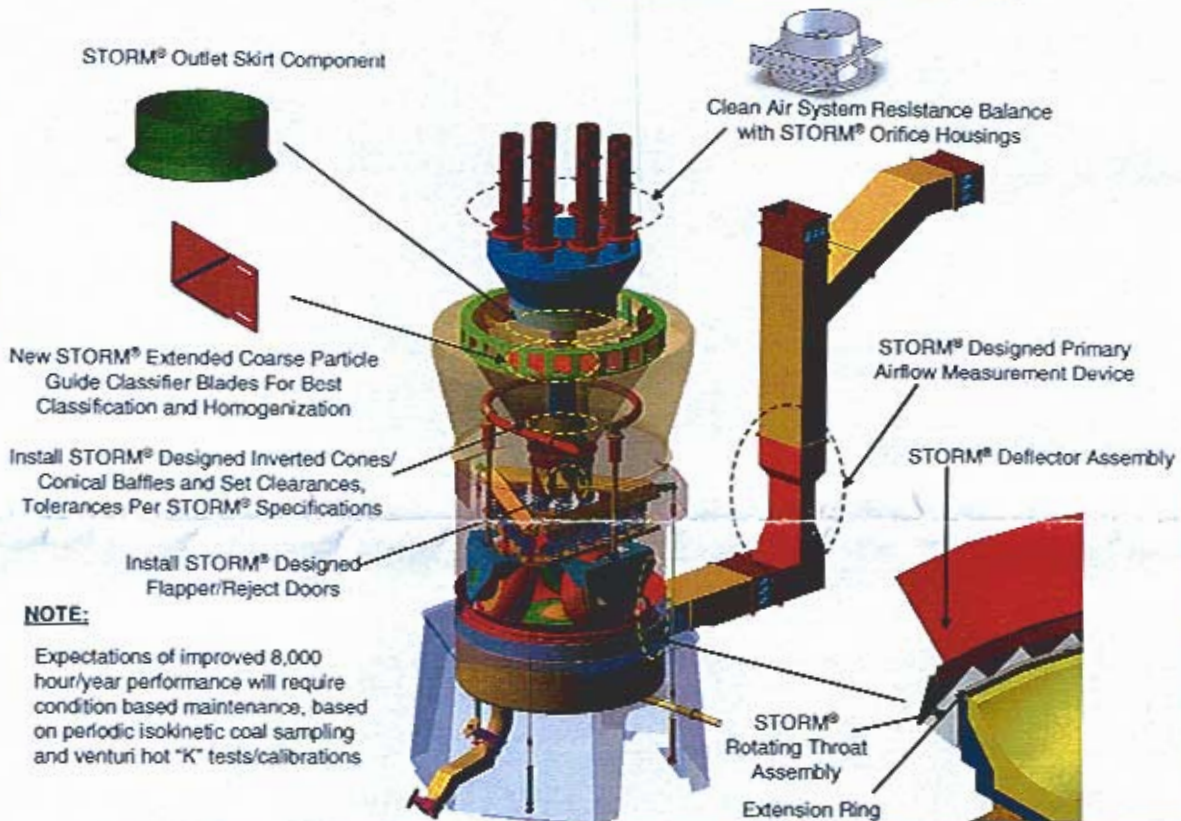


NEW FABRICATION CAPABILITIES OF STORM TECHNOLOGIES “PROVIDING QUALITY ENGINEERED PERFORMANCE SOLUTIONS”

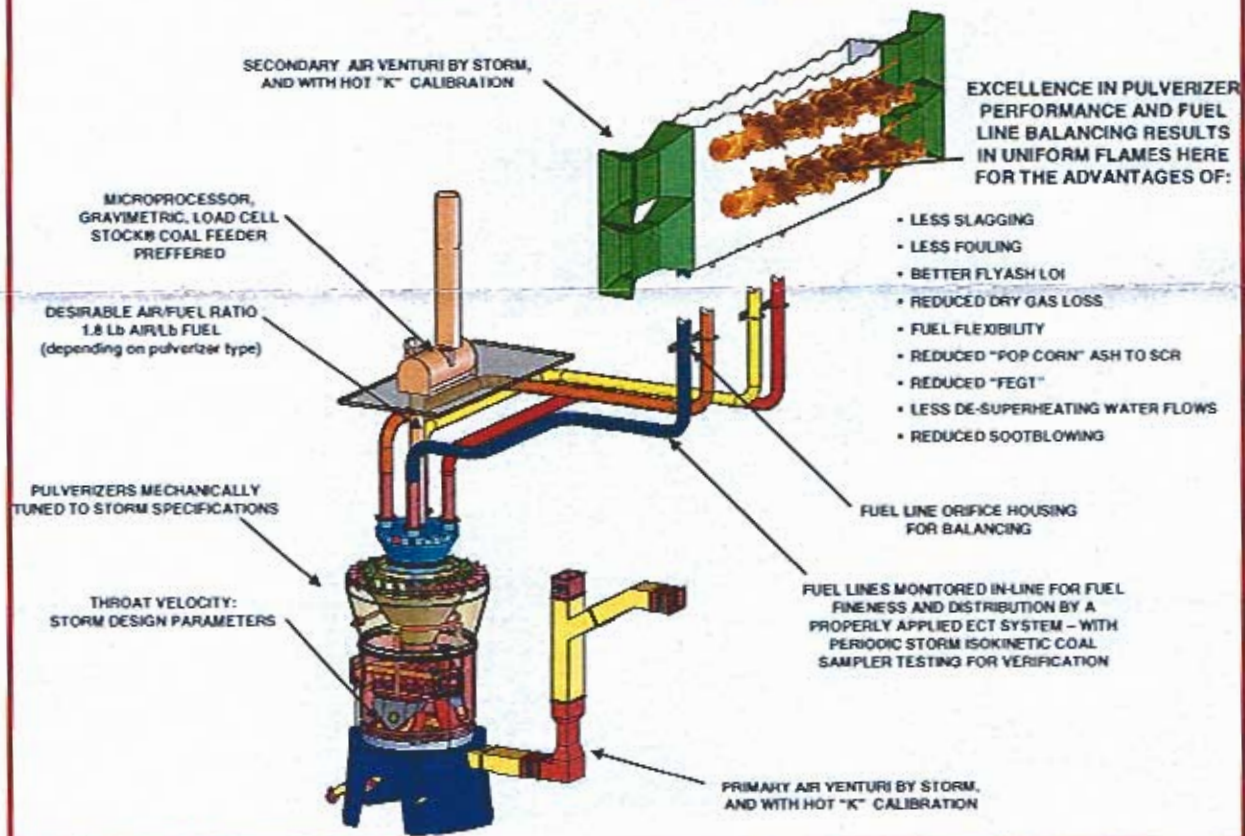
Storm Technologies, Inc. has recently acquired a complete fabrication shop (approx. 21,000 Square feet) capable of fabricating the majority of ALL equipment recommended by STORM. The following include some photos of recent work completed in the shop. This decision was based on the pricing & scheduling of sub contracting shops & determined that the majority of the work will be completed in the new facility. The new shop will allow STORM to control the schedule & costs of all projects, especially those required on an expedited basis to meet the plants schedule needs. STORM specializes in airflow measurement devices, pulverizer performance components, ductwork, piping, water-cutting, etc... *Please give STORM a call to provide you with a proposal and schedule to complete most fabrication needs:*



STORM RECOMMENDED PULVERIZER MODIFICATIONS

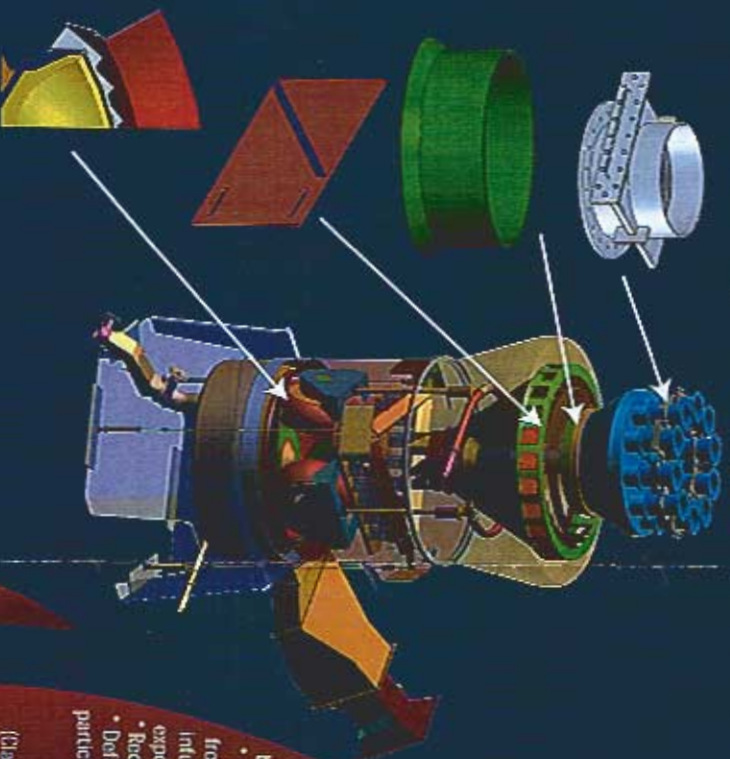


THE STORM SOLID FUEL INJECTION SYSTEM APPROACH TO FURANCE COMBUSTION EFFICACY



STORM TECHNOLOGIES, INC.

Pulverizer Optimization Components



Benefits of STORM® Pulverizer Optimization Components:

STORM Grinding Zone Improvements (Rotating Throat and Deflector)

- Reduced or eliminated coal rejects, improved venting for improved grinding and improved primary airflow controllability.
- Increased pulverizer & furnace residence time.
- Improved coal fineness.
- Capability to reduce air/fuel ratios.
- Help to reduce FEGTs with improved combustion lower in the furnace.
- Reduced available "free" oxygen in the high temperature flame core at burner.
- Excessive amounts of primary airflow tend to force ignition points away from the burner as a result of higher burner nozzle velocities, thus allowing infusion of oxygen "rich" air into the flame core and increasing NOX exponentially.
- Reduce pulverizer vibration & rumbling.
- Deflector sets an open area to maintain an acceptable velocity to keep coal particles in suspension and prevent coal spillage.

STORM Classifier Zone Improvements (Classifier Blades, Girdle Cylinder, Reject Zone, and Orifice Housings)

- Reduce 50 Mesh (Coarse Particles) By-Pass.
- Reduce intensity of "oxidizing" and "reducing" Atmospheres with Furnace.
- Reduction of Carbon In-Ash (CII)
- Improved Soot, Fuel Homogenization and Fuel Distributor
(Must be Properly Designed and Primary Air Metered and Controlled)

Notes: STORM® Can Implement the Previous Components and/or Similar Concepts for Different Variations of Pulverizer (Various Vertical Spindle Types, Ball Mill, Attrita, Etc...), and Classifier Types.

Components
Consist of But Not
Limited To the
Following:

- Primary Airflow Management
- Rotating Throat & Deflector
- Extension Ring (If Required)
- Classifier Blades
- Outlet Cylinder
- Reject Area Improvements
- Orifice Housings



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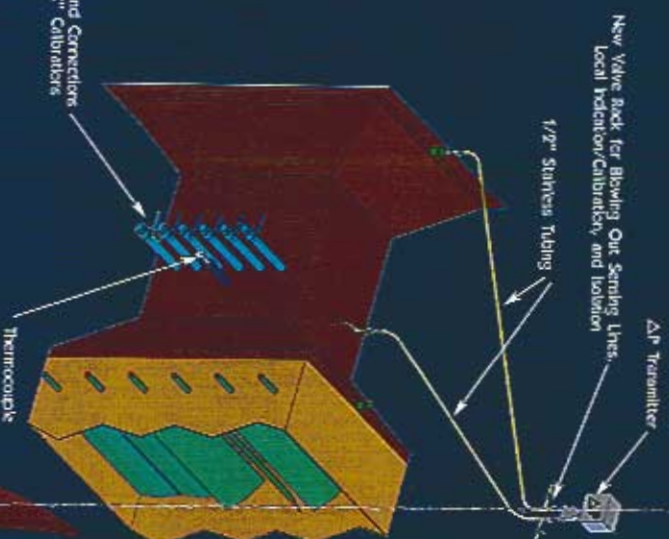
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Airflow Management and Control

WHAT IS THE PREFERRED WAY TO MEASURE AIRFLOW?

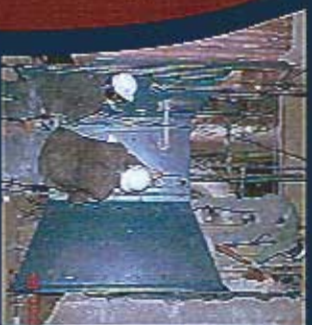
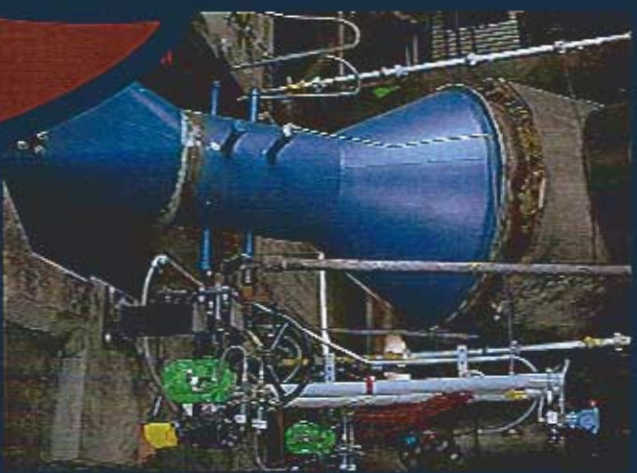


In most cases, the primary secondary and over fire air (OFA) is either relative or assumed and not accurately measured and controlled across the entire load range. Sometimes the flow is either in a percentage and/or not even temperature corrected if it has an indication at all. It should also be noted that the venturi and/or flow nozzle is the best method for the desired accuracy and repeatability in STORM's experience. Un-recovered pressure drop is the only draw back to these devices; however with proper location and design the majority of the pressure drop can be recovered if adequate space is available. We have found that the accuracy and controllability of a unit is much more important than saving a couple of inches of water pressure drop.

We have seen and tested numerous types of Hot Wire Anemometers, low differential pressure type devices with flow straighteners, and various other averaging Pitot tube arrays. Based on our testing of these components, we have found significant errors from normal operating conditions. This type of device is generally calibrated in a laboratory (with supposedly 2% accuracy) and not real operating conditions. In addition, they operate on very low differential pressures, and minimal noise can impact indication significantly. Field testing on these devices has found significant indication errors under operating conditions. In addition, these probes and/or straightening devices are more likely to plug with the lower differential & velocities.

With inaccurate indication and control of the Primary Secondary or OFA airflow, it can easily cause a unit to have poor fuel and air mixing distributions, high MOX and LOI, high furnace exit gas temperatures, slagging, poor fuel fineness & balance, excessive re-heat & super-heat spraylines, etc...

Let STORM help design and provide your plant with accurate and reliable airflow measurement devices for any location and Real Operating Conditions.



Benefits of STORM® Airflow Measuring Devices:

- ECONOMICAL
- Improved Unit Controllability
- Ability to Measure and Stage Airflow's
- Accurate Air/Fuel Ratio Control
- Improved Accuracy and Repeatability
- Smooth Control Across Load Range

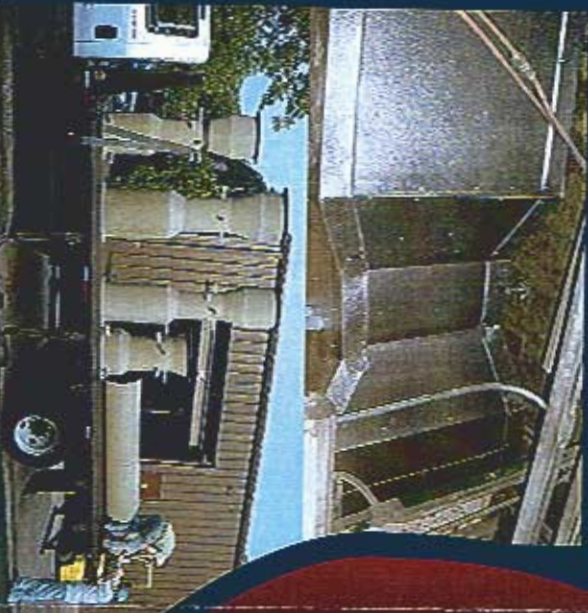


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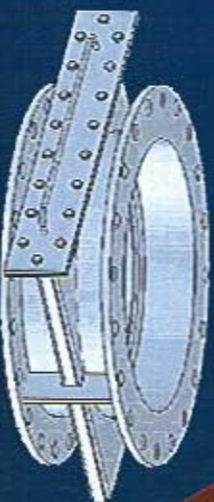
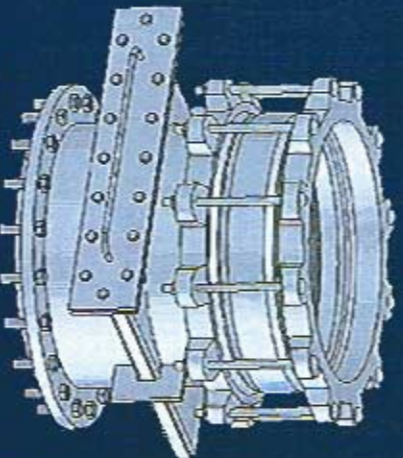
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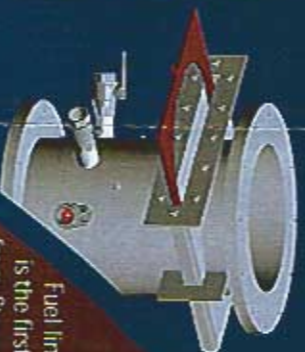


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Orifice Housing Boxes



Fuel Line Orifice Housings



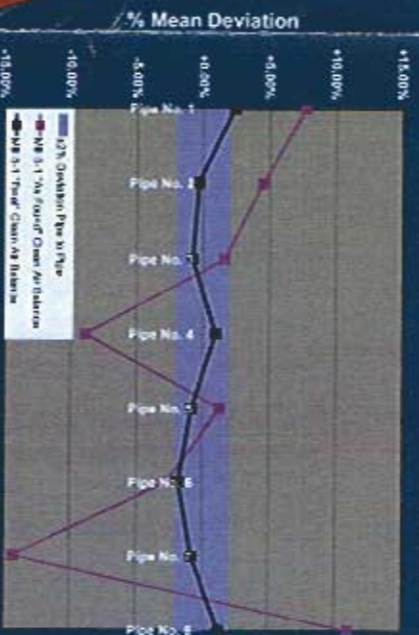
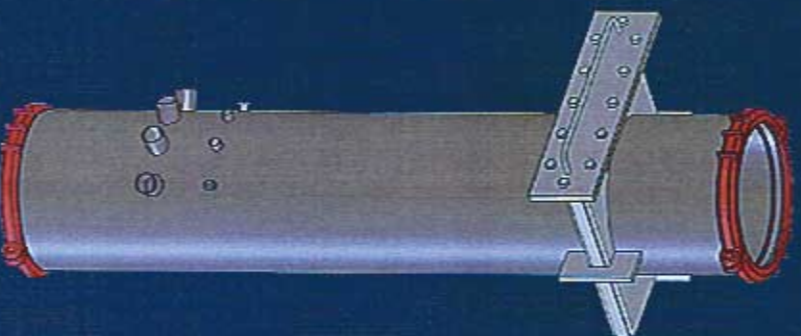
Fuel line balancing with square edged orifice plates is the first step in balancing fuel to each individual pipe from Storm Technologies, Inc. experience. This method used to require a team of mechanics hours to dismantle flanges, separate flange to change orifice plates, which may require several iterations to get within the recommended 2% deviation pipe to pipe.

Now, Storm Technologies, Inc. provides an ECONOMIC orifice housing that can be prepared in just about any configuration (i.e. adapt to Victaulic type fittings, flanged, or simple spool piece on each end to butt welded together). The balancing is generally completed just after the orifice housings have been installed and balanced under "clean air" conditions with NO coal. NOW with a professional team of STORM employees, this balancing can be completed SAFELY in a matter of hours.

Properly balanced fuel lines by the "Clean Air" method described benefits burner performance, fuel distribution, combustion (slagging and oxygen balance at the furnace exit), boiler efficiency and NO_x reduction. As noted, this is the first major phase in addressing a comprehensive fuel and air balancing program to each burner. In addition to this balancing Storm Technologies, Inc. can also assist with classifier improvements and primary airflow management to accurately control and regulate across the entire load range.

Benefits of STORM Orifice Housings:

- ECONOMIC
- Ease of Installation
- Changes Made Safely and Quickly
- Better Burner Performance
- Improved Fuel Distribution
- Improved Boiler Efficiency
- NO_x and CO Reduction



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