



STORM TECHNOLOGIES, INC.

411 North Depot Street PO Box 429

Albemarle, NC 28002

Phone: 704/983-2040, Fax: 704/982-9657

www.stormeng.com



How Storm's Resources Can Be Utilized for Measurement and Control of Airflow

The 13 Essentials have been proven to be a great start for pulverized coal fueled boilers for many years. Most of the 13 Essentials are air and fuel balance related. This is not to diminish the importance of measuring and controlling combustion airflows accurately and for optimum combustion. Just as a reminder, the following eight boiler performance aspects can be optimized by accurately measuring and controlling combustion airflow:

- Fuels flexibility
- Slagging and fouling of the furnace
- Unit heat-rate/efficiency improvement
- Maximizing unit load capability
- Load response
- Reliability and minimization of waterwall wastage
- Precise primary airflow is required for pulverizer fuel fineness optimization
- Best in-furnace NO_x performance

To be sure, precise airflow measurement and control is truly a prerequisite for optimum combustion for all types of boilers. Whether pulverized coal, CFBs, stoker fired, cyclones, wall fired, corner fired, etc.

You know that for years Storm has been recommending precise measurement and control of airflows. What you may not know is that in the last 17 years that we have been in this business, we have grown in our capabilities of executing the application of our recommendations so that optimum results can be obtained. Storm now has FEA and CFD modeling capabilities in our engineering department. Our fabrication shop can build the devices and our field services teams, which you may have known for years, still perform plant testing, calibrations and technical direction of improvements.

The purpose of this communication is to show some examples of Storm's engineering, fabrication and results oriented improvements to large power boilers to address Storm's motto SERVICE/QUALITY/RESULTS! The following is an actual current example of this process.

Case Study:

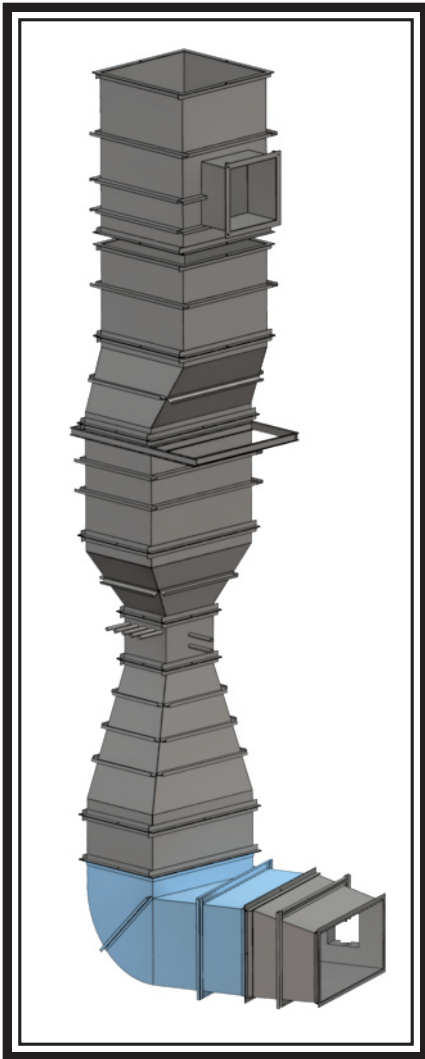
Recently Storm has been working on some new projects to incorporate our airflow management into the replacement of some old primary air duct work that was scheduled for replacement with the incorporation of Storm airflow measurement devices. Of which our shop was capable of building all seven (7) pulverizer primary air duct work sections (approximately 100,000 lbs of duct work) for a western plant.

- Duct work was locally measured in the field and verified by plant drawings
- SolidWorks 3-D modeling of the duct work was completed
- Finite Element Analysis (FEA) was completed on the duct integrity and used to design structural supports and stiffeners as required for adequate safety factors
- Computational Fluid Dynamics (CFD) modeling was conducted for final design and review of airflow measurement device
- New duct work drawings and "approval" drawings were provided to the customer for final review
- The duct work was fabricated in 3 weeks and shipped to meet expedited requirements
- Technical direction of installation was available as required
- Field testing and calibration tests (hot "K" factor) to verify accuracy and control

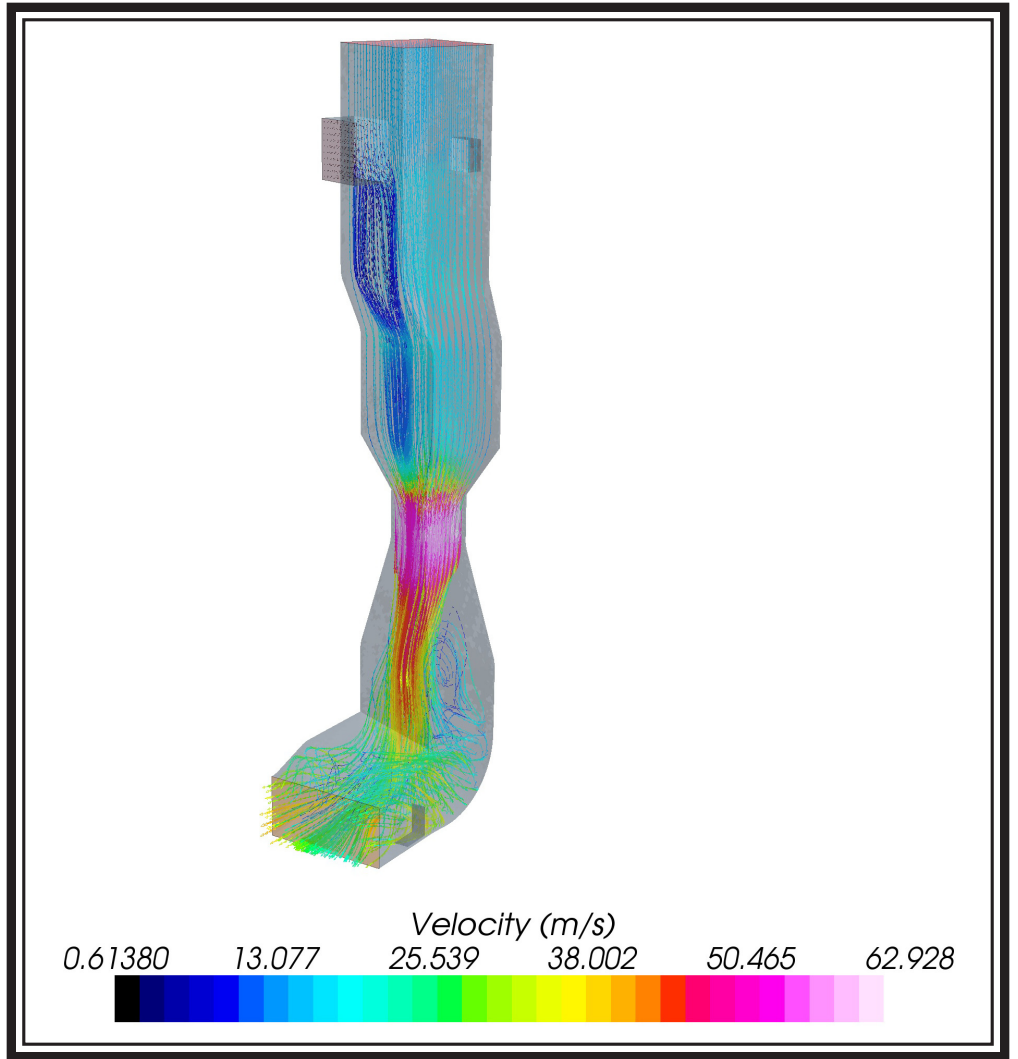
The following pages show an overview of the design and fabrication process completed by Storm on the duct replacement. Also featured are a few products that were fabricated at the same time including other airflow measurement devices, stainless steel duct work and expansion joints.

Sincerely,

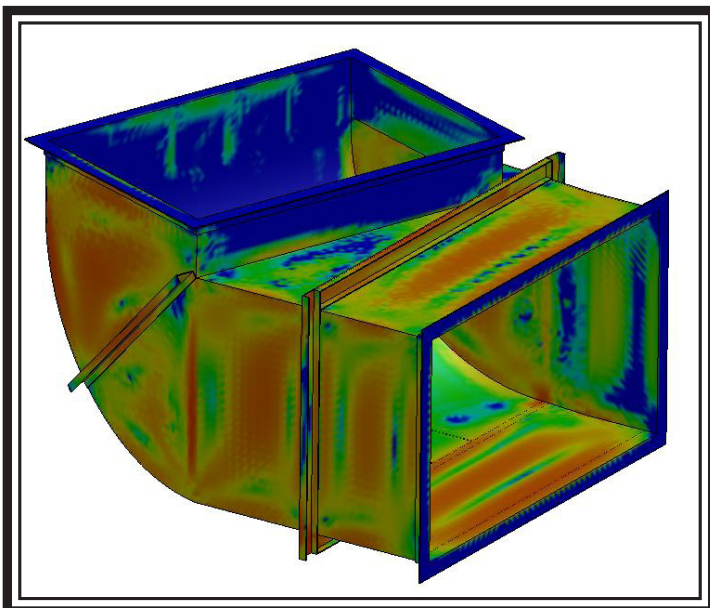
Richard F. Storm
Senior Consultant/CEO
Storm Technologies, Inc.



3D Modeling



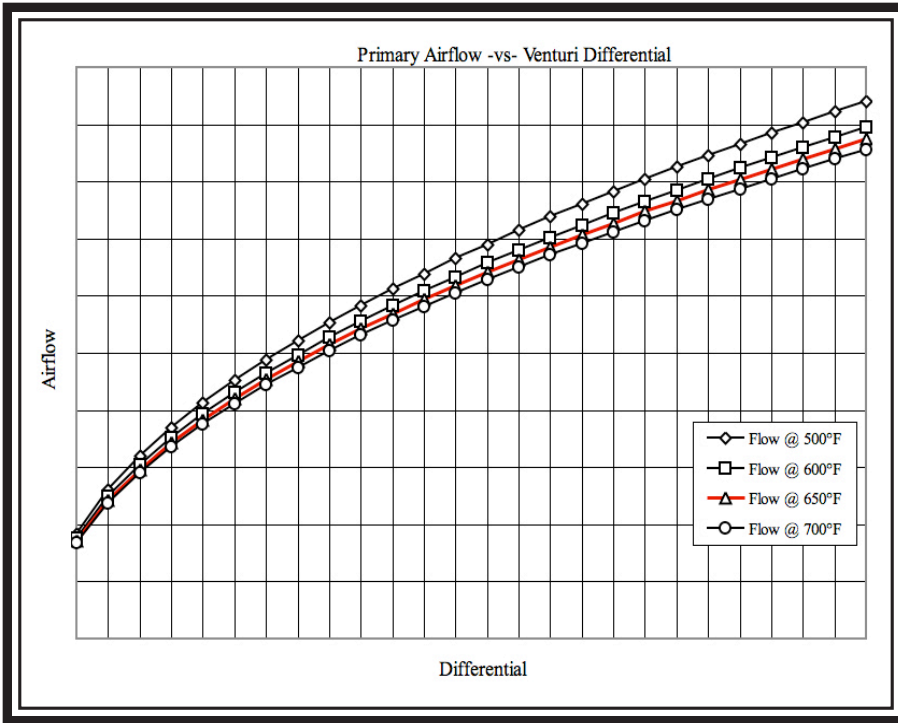
CFD Modeling of Duct



FEA Analysis of Duct Design



Actual Duct Fabrication in Progress

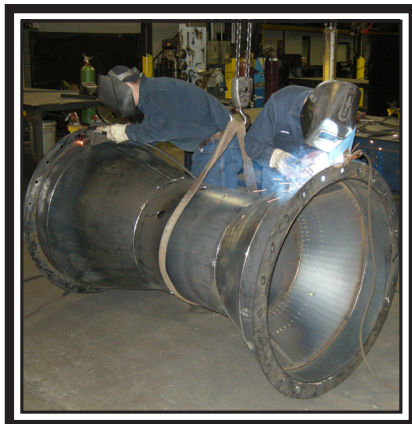


Proposed Design Airflow Curve



Actual Duct Being Installed

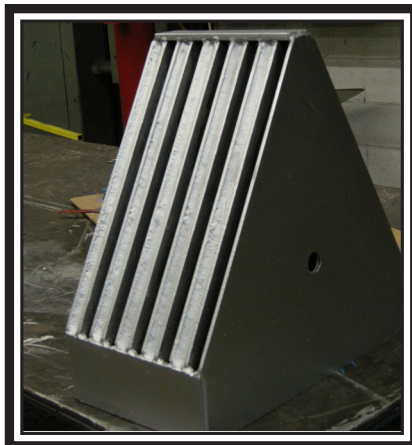
What began as a conceptual design and proposal often becomes cost effective RESULTS for our customers. Storm Technologies, Inc. has the experience, tools and the abilities to offer “turn key” solutions from engineering, design and fabrication to technical direction, testing and tuning services for all general boiler and combustion system components. Our commitment to our motto SERVICE/QUALITY/RESULTS drives us to meet and exceed all of our customers’ needs from concept to completion. Here is some of our current work:



Storm Primary Air Venturi



Stainless Steel Expansion Joint for Hot Air Duct



Riffles



Stainless Steel Mill Inlet Duct



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FABRICATED SOLUTIONS

ENGINEERING TOOLS

- 3D Modeling
- Computer Aided Drafting (CAD)
- Finite Element Analysis (FEA)
- Computational Fluid Dynamics (CFD)

FIELD SERVICES

- Storm Provides Services for Coal (PC, CFB and Cyclone), Oil and Gas Fired Boilers
- Complete Annual Service Contracts
- Technical Direction of Outage Repairs
- Complete Testing Programs
- Flyash Carbon Reduction Programs
- Combustion Improvement Programs for:
 - Pulverizers
 - Burners
 - Fans
- Testing and Corrective Plans of Action
- Secondary Air Balancing
- Heat Rate Improvements Through Boiler Optimization Programs
- Failure Analysis
- Consulting
- Seminars
- Immediate Technical Responses
- Fast Service Turn-Around Time
- Total Combustion Improvement Programs
- Custom and Proven Pulverizer Performance Tuning Services
- Fuel Line Balancing Improvements
- Combustion Optimization Inspections
- NO_x and CO Emission Reduction Tuning
- Fuel Change Evaluations and Improvement Consultations
- Reduction of Furnace Slagging
- Air In-Leakage Determination Through Testing and Inspections
- Air Heater Leakage and Performance Testing and Tuning to Optimize Superheat and Reheat Temperatures to Reduce Spray Flows
- Fuels Flexibility Improvements/Test Burns

FABRICATED COMPONENTS

- Airflow Management Systems
- Fuel Line Orifice Housings
- Chordal Thermocouples
- Oil Atomizer Tips
- Overfire Air Systems
- Duct Work
- Replacement Riffles
- Spinner/Spreaders
- Pulverizer Optimization Components
- Classifier Blades
- Outlet Cylinders
- Reject Doors
- Rotating Throat and Deflectors
- Inverted Cones
- Serpentine Straps
- Metal Expansion Joints
- Ceramic Tile and Duct Linings

FABRICATION CAPABILITIES

- CNC Plasma Cutting up to 1" thick metal of any shape
- 200 Ton Brake Press to form up to 1/2" thick carbon steel
- Webb Plate Roll with capacities up to 3/4"-1" thick carbon steel
- Metal punch and shear for up to 1 1/2" dia. holes and 6" angle iron in carbon steel
- Structural Tubing Bender up to 2" X 2" of carbon steel
- CNC Machining Capabilities
- ASME Code Stamp "S" and "U" Certificate Holder
- National Board "R" Stamp Certificate
- Fabricated Solutions can weld and form most materials including carbide overlay and stainless steel

LAB SERVICES

- Flyash Unburned Carbon Analysis
- Flyash Sieve/LOI 3 Part Analysis
- Coal Fineness Analysis