STORM'S FABRICATION CAPABILITIES AND OUTAGE SUPPORT

Having a collection of respectable, reliable suppliers is essential in properly operating any business, and in today's climate, with supply chain and dependability issues, finding those suppliers can be a challenging task. Government regulations and the push for increased renewable power have become more and more prevalent, and many coal-fired power plants need to evaluate and determine the best return on investment with high-cost capital projects allowing the plant to continue operating while meeting these policies. In addition to the stringent government policies and the ever-increasing costs of generation due to emission reduction improvements, many original equipment manufacturers (OEM) are pivoting their focus to other target markets or are completely exiting the power industry. Although Storm Technologies, Inc. is not a manufacturer of components such as scrubbers, selective catalytic reduction (SCR), selective non-catalytic reduction (SNCR), or other large-scale emission reduction equipment, our attention is focused on the smaller-scale components of the fuel/fire side of the system. By this, we mean the components from the pulverizer to the burners. In fact, the pulverizers provide the greatest number of opportunities to keep combustion optimized. While these parts may be small-scale in relation to large capital projects, they can have a large-scale impact on the boiler's performance, fuel cost savings, and other costs associated with forced outages.

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- Advantages of Boiler Cleaning with Shock Waves

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STORM's mission is to emphasize how we can help your plant reach the best performance, reliability, efficiency, emissions, and capacity while generating reliable, low-cost, clean, and efficient electricity for your customers. We have written extensively over the years about the importance and the effects of combustion fundamentals or performance-driven maintenance programs. Why performance-driven maintenance is so important:

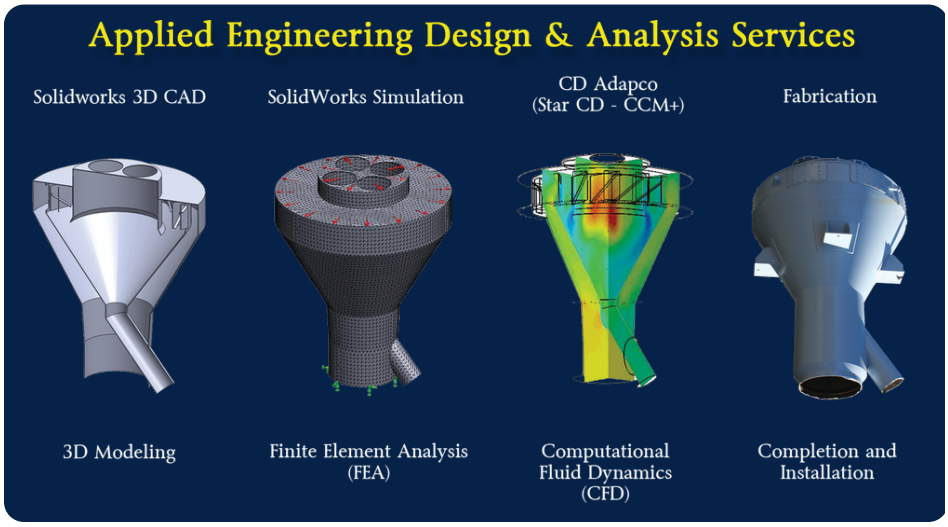
- Improved heat rate and efficiency
- Reduced LOI (carbon in ash)
- Reduced furnace slagging
- Reduced NOx and fan capacity by balancing fuel/air to the furnace.
- Reduced superheat & reheat sprays
- Improved fuel flexibility
- Reduced SCR and backpass fouling
- Improved unit reliability and forced outage rate

Concept to Completion

Storm Technologies, Inc. is more than just testing crews pushing a probe in a boiler or pulling coal samples out of fuel lines. We also have the experience and the abilities to offer resourceful solutions from engineering, design, and fabrication to technical direction, testing, and tuning services for all general boiler and combustion system components. What begins as a conceptual design, often becomes cost-effective RESULTS for our customers. We are fully committed to our mantra "QUALITY, SERVICE, RESULTS" and we are driven to all of our customers' needs, from concept to completion.

STORM Engineered Solutions

- Airflow management systems
- Fuel line air/coal balancing systems
- Pulverizer optimization components
- MATS testing grid systems
- Burner optimization components
- Overfire air systems



Design

Our staff of experienced, qualified engineers and technical personnel are proficient in reviewing plant drawings, data, schematics, DCS logic, and understanding underlining issues to create an effective and cost-efficient engineered solution. Design work is completed with the collaboration of engineers and designers with the use of the most current CAD software (SolidWorks and AutoCAD).

Finite Element Analyses (FEA)

STORM uses SolidWorks Simulation to analyze the structural integrity of our engineered solutions. This software allows us to review the real-world conditions put on our designs and determine the strength and safety of our fabricated components.

Computational Fluid Dynamics (CFD)

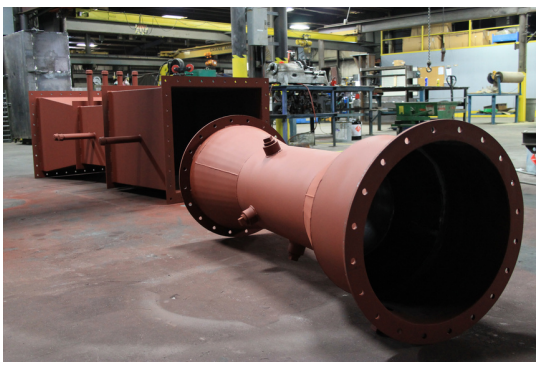
CFD analyses involve engineers using 3D models created from our SolidWorks software to predict the performance of fluids (air/gas) through our engineered solution designs. Our staff currently uses Simcenter's STAR-CCM+ software for these types of analyses. Storm believes that CFD modeling is a great tool for forecasting our designs in a real-world application. However, the results are a rationality check of engineering experience and test data.

Fabrication

Fabricated Solutions, LLC is the proud manufacturing facility for Storm Technologies, Inc. The 20,000 sq. ft. ASME code facility prides itself on its highly qualified staff ensuring fast, accurate, reliable, and high-quality products. With its dedicated fabrication facility, STORM has full control of resource capacity and scheduling to allow for superior customer service. This is where our engineered solutions come to life and become a reality.

What Storm can provide:

- Orifice Box / Fuel Line Isolation Housings
- Replacement Riffles
- Pulverizer Rotating Throats and Deflectors
- Pulverizer Classifier Blades
- Pulverizer Outlet Cylinders
- Primary Air Measurement Devices
- Secondary Air Measurement Devices
- OFA Measurement Devices
- Ductwork Replacement Sections
- Control Airflow Dampers
- Chordal Thermocouples
- Oil and Igniter Tips
- Multi Point Probes for boiler tuning
- ASME Code work (Pressure Vessels)
- Diagnostic Testing Equipment



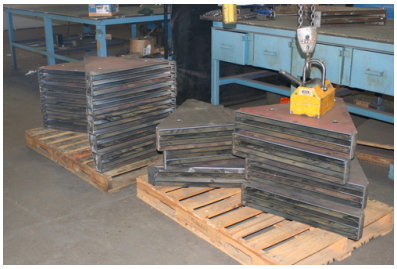
Pulverizer Components and Their Impacts

Many of the things that a plant can do to address poor combustion, high loss on ignition (LOI), excessive emissions levels, furnace fouling and slagging, and unit derating is by looking at the “heart” of the combustion system, the pulverizers. The purpose of the pulverizers is to transport air and pulverized coal to the burners; similar to one’s heart pumping blood throughout the body. It cannot be stressed enough that the importance of proper pulverizer operation and maintenance has on the total combustion process. Remember the expression: garbage in - garbage out.

Are you seeing the boiler tubes accumulating slag and causing waterwalls or other tubes to burst? Maybe the burners are starting to slag over, forming “eyebrows”, or maybe there are high LOI levels in ash in the back end. These all can be an effect of poor fuel fineness levels entering the burners.STORM recommends that fuel fineness shall be 75% or more passing a 200-mesh screen and 50-mesh particles shall be less than 0.1%. Classifier blades and outlet cylinder extensions are excellent parts to reassess when addressing fuel fineness. STORM engineers custom design these parts to assist in the downward redirection of coarse coal particles toward the classifier bottom/grinding area while reducing 50-mesh particle bypass of coal to the burners.

Perhaps you are seeing more localized issues within the furnace. This can be caused by poor fuel/air distribution to the burners. Properly balanced fuel lines, by clean air balancing, benefits burner performance, fuel distribution, combustion, boiler efficiency, and NOx reduction. Many manufacturers in the industry offer some sort of method or equipment to equalize the distribution of fuel and air across all the fuel lines per respective pulverizer. Some of the offerings we have seen over the years are mill outlet swing-gate valves; adjustable orifice assemblies; or spool/riffle-installed fixed-size orifices. From our experience, these options leave little to be desired when it comes to operability and ease of maintenance. We have seen adjustable orifice mechanisms seize during operation and fixed spool OEM orifices no longer being the indicated orifice size opening due to years of wear and regular maintenance neglect. STORM engineers have designed a simplified orifice assembly that houses a 3/8” thick AR400 square-edge orifice plate. Many of our customers prefer this option due to in simplicity, safety, ease of installation and maintenance, and possible fuel line isolation opportunities.

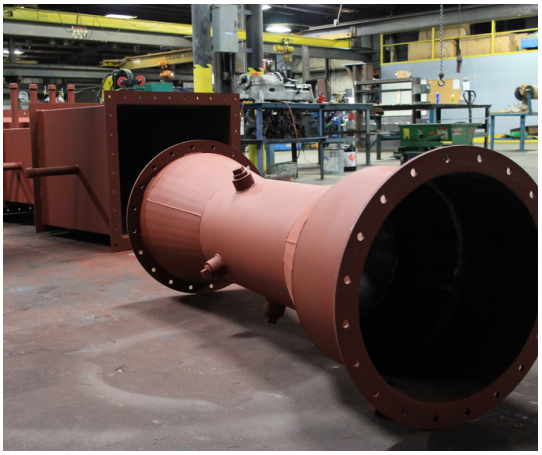
One final word about STORM-designed pulverizer components. Most of our pulverizer components can easily be installed during a preplanned outage or even possibly a forced outage with minimal labor costs. Our components are uniquely designed for our customers’ respective pulverizers, fuel lines, connection types, and configurations. We work in collaboration with plant personnel to design equipment that not only works but can be easily and efficiently installed by maintenance personnel.



Airflow Measurement Devices and Their Impacts

STORM has many years of experience in designing, fabricating, and calibrating a variety of airflow measurement devices. We frequently find that many plants are unaware of poor airflow management and control. A good first step to good airflow management is metering and proper distribution of all airflow as it is critical to boiler optimization. Remember the fundamentals: garbage in – garbage out! We have written countless newsletters and articles outlining the importance of airflow measurement and management, and those all can be found on our website for further reference.

STORM prefers venturis or flow nozzles over averaging pitot tubes in most cases, depending on the arrangement of the ductwork. While averaging pitot tubes are economical, functional, and can be accurate, depending on the flow conditions, the tiny impact holes typically plug and can have a significant effect on the signal to the differential transmitter, giving a false measurement reading. Our venturis are typically provided with large 1.50" pipe pressure taps to prevent the ash plugging that is typically found with pitot tubes. Our venturis also typically provide a smoother differential signal and have the capability to improve DCS logic and control curves so that an optimum airflow can be achieved across the normal operating load range.



Over the years, we have designed and fabricated a variety of venturi designs focusing on the application and where they were being installed on the system. Some have even been installed in locations where it was thought not possible! For these difficult applications, we typically perform computational fluid dynamic (CFD) models to predict any operating air flow or temperature stratification, or excessive non-recoverable pressure drop. Working in collaboration with plant personnel, we review existing layouts and operating conditions to design the best possible engineered solution. Each venturi is truly unique and designed specifically to meet our customers' requirements and applications.

Outage Support

As mentioned, we have witnessed more and more OEMs and other once-dependable vendors pivoting to other markets and not willing to support or provide plants with replacement equipment. This can be truly troubling when it comes to planned outages and even more so if an outage is forced. Not only does Storm Technologies, Inc. offer a wide range of equipment to improve your boiler's performance and reliability, but we also have an ASME code fabrication facility to meet your plant's outage needs. We are able to provide our products in an immediate time frame (most projects can start the SAME DAY, depending on material, complexity, etc.). This includes in-kind replacement parts, ductwork, airflow dampers, pulverized coal burner components, and many other of our engineered solutions for improved performance, unit reliability, and heat rate.

Want to learn more about how we work with coal plant operations and maintenance teams to help deliver performance-driven maintenance? Feel free to visit our website, www.stormeng.com, or give us a call at 704-983-2040 to learn more.

Respectfully,

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Design Project Manager
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