

PULVERIZER SERVICES - COMBUSTION OPTIMIZATION PROGRAM



Riley Power
a Babcock Power Inc. company

OVERVIEW

Riley Power Inc., a Babcock Power Inc.® company, designs and manufactures steam generators and fuel firing equipment for all types of fossil fired and waste fuel fired plants. Additionally, Riley Power can assist operators of existing boilers to maintain and operate them at their optimum efficiency and availability, while meeting ongoing environmental regulations.

Updated MACT Rule requirements for meeting specific emissions limits and conducting periodic burner tune-ups, requires even greater awareness of boiler performance.

Riley Power Inc.'s Combustion Optimization Program addresses mill system performance in a systematic approach to control fineness and distribution so that slagging, LOI, CO, NOx can be optimized.

First, the pulverizer system is reviewed for its ability to grind the coal and deliver balanced fuel to each burner at sufficient fineness. Investigated areas include:

- Coal analysis and its affect on mill performance
- Mill heat balance to determine required air/coal ratio and thermal head needed
- Coal pipe, burner and mill throat velocity

Once the system capabilities have been identified, the milling system is tested to determine baseline conditions, set up for A/C characterization and coal distribution is optimized.

Lastly, specific recommendations are made to improve mill performance, if needed, and further improve coal distribution on a pipe-to-pipe basis.

EXPERIENCE

As an Original Equipment Manufacturer of three distinctly different coal pulverizer systems, Riley Power Inc. understands the necessity of optimizing pulverizer system operation. The Riley Power family of pulverizer offerings includes the MPS vertical roller mill, the Atrita high-speed attrition mill and the ball tube mill.

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BENEFITS OF OPTIMIZED MILLING SYSTEMS

The benefits of optimizing pulverizer systems can be considerable, generally resulting in overall improved operation, including:

- Reduced levels of LOI/UBC
- Increased coal fineness
- Lower CO emissions from improved fuel balance and fineness
- Lower NOx emissions
- Reduced slagging and fouling
- Balanced O₂ profile across unit
- More uniform tube metal temperatures
- Increased boiler efficiency
- Improved plant heat rate

TESTING & ANALYSIS CAPABILITIES

- Coal flow balancing
 - Pf-FLO III for coal flow measurement
 - Dirty air probe for dirty air balance check
 - Clean air testing for PA calibration
- Coal fineness testing (ASME/ASTM)
- Coal sample sieve analysis/report
- Pulverizer capacity review/corrections
- Pulverizer heat balance calculations
- A/C ratio characterization curves
- Raw coal sample Prox, Ult, HGI, etc.
- PA flow device calibration (3D pitot traverse)





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Riley Technical Services uses this extensive knowledge base in our pulverizer optimization programs, and makes Riley Power uniquely qualified to work on all pulverizer systems, regardless of the original manufacturer.

TEST METHODS

The measurement of individual coal line velocities, density and mass flow is typically done with Riley Power's portable Pf-FLO III system, where a continuous trend of data is established for each coal pipe.

Conventional dirty air and coal fineness test methods look at a single point in time. These methods are subject to variation according to technique, fluctuations in flow conditions and test equipment, and also require multiple iterations. These conventional testing methods do not provide accurate, real time measurement of coal flow in each pipe.

Using the Pf-FLO III system, the effect of Riley Power's on-line classifier and riffle adjustments are seen immediately. Once the Pf-FLO III system is set up, balancing coal distribution of each mill system can usually be completed in a day.

MILL TESTING

The Riley Power mill testing programs focus on the need for fuel and primary air balance, as well as optimal grinding performance. Initial testing is done to establish the baseline or "as found" conditions. Mill testing includes coal fineness testing to establish capacity and performance. Pf-FLO III for measuring coal velocity, density and mass flow and dirty air testing is done to balance primary airflow. Calibration of the primary airflow measurement device is recommended to verify its accuracy.

COAL BALANCING METHODS

The method employed for balancing coal distribution varies, depending on the type of pulverizer. For the MPS, EL, HP type and BTMs with centrifugal classifiers Riley Power uses its patent pending PF-Distributor™ Coal Flow Balancing System. For PRI's Atrita and the Raymond style mills that use riffle distributors, Riley uses its Variable Coal Riffles (VCR's).

PF-DISTRIBUTOR™

Riley Power's PF-Distributor™ coal balance system for centrifugal classifiers, inserts into the discharge turret of the classifier to alter the trajectory of the coal particles as they enter the turret area. The device does not restrict or accelerate primary airflow, but rather actively moves the heavy concentration areas of coal until balanced distribution between coal pipes is achieved. All adjustments are made with the mill in service.

VARIABLE COAL RIFFLE (VCR)

Riley Power's VCR coal balance system for riffle distributors adds adjustability to the standard riffle assembly. The trajectory of the coal particles is adjusted as they enter the riffle. Coal distribution is balanced with very little affect on primary air balance. VCR adjustments for balancing coal distribution are made with the mill in service.

VARIABLE ORIFICE

The Riley Power variable orifice is used for balancing coal, pipe pressure drop and clean airflow. Typically placed as close as possible to the mill exit, this device can be used initially as an adjustable orifice for clean air testing and data collection for sizing the permanent orifice. The standard donut orifice can be replaced with the properly sized permanent orifice for balanced clean airflow to each burner.

SAFETY³ PEOPLE. POWER. PROJECTS.
We're giving safety the third degree.

Babcock Power Inc. and its subsidiaries place the safety, health and security of our people at the core of our company values. Our team is our most valuable resource, generating solutions everyday to deliver safe, clean, reliable energy globally. With a keen focus on safety, Babcock Power Inc. conducts business in a manner that protects our people, our customers and the environment. From innovation to generation, we are proud of our award-winning safety record and are committed to operating with integrity and excellence.

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