Riley Power

SUCCESS STORIES

MIDWESTERNER UTILITY PF-DISTRIBUTOR™

RILEY–BALL TUBE MILL

LOCATION	**INDIANA, U.S.A.**
UNIT OEM/SIZE	**RILEY - 500MW**
FUEL	**EASTERN BITUMINOUS COAL**

PROJECT OVERVIEW

A Midwestern Utility recently upgraded their Riley Ball Tube Mill (BTM) system with Riley Model 80 classifiers that incorporated the recently patented PF-Distributor™. After 35 years operating the original classifiers, it was time to replace and incorporate new technology, providing greater classification control than the original classifiers. Poor coal fineness and coal mal-distribution were resolved with the new Model 80 classifier & PF-Distributor™. The focus of this project overview is the performance of Riley's new PF-Distributor™. This product was developed to address an industry-wide problem of coal line mal-distribution which can contribute to CO and unburned carbon (UBC).

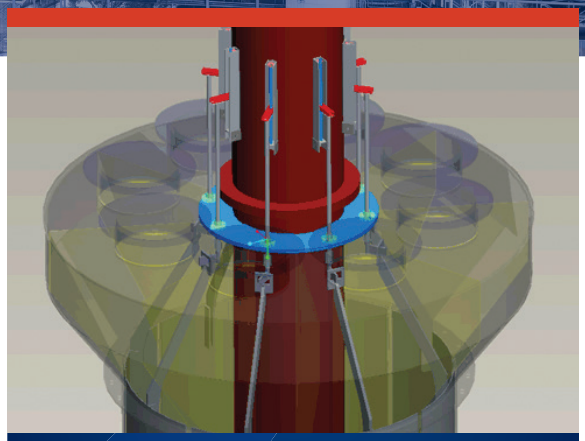
INDUSTRY PROBLEM

Coal mal-distribution is a common problem that occurs with any type coal pulverizer system. Mal-distribution of coal in the ± 30% range is not uncommon. This occurs despite having well-balanced clean airflow in the coal pipes. Fuel imbalance between burners produces a wide variation in primary air/coal ratio and heat input across the furnace.

UNIT DESCRIPTION

Riley Power Inc. "Dry Bottom Turbo" Unit

Unit Output	235 MWe
Steam Flow	1647 kpph
SH Steam Pressure	1990 psi
SH Steam Temperature	1005°F
RH Steam Pressure	485 psi
RH Steam Temperature	1005°F



RILEY POWER SOLUTION

New Model 80 classifiers with the patented PF-Distributor™ were installed on three double ended Riley ball tube mills. Each mill has two classifiers with a four pipe outlet. The goal of the project was to improve coal fineness and pipe to pipe coal distribution from the original 35 year old design. The Model 80 classifier is designed to improve coal fineness while the PF-Distributor™ to improve coal distribution.

These fuel imbalances are responsible for problems such as high CO, high UBC, excessive slagging/fouling, excessive and unbalanced tube metal temperatures and attemperator flows. Mal-distribution of coal is generally addressed by changing pipe-to-pipe airflow using fixed or adjustable orifices. However, this "backpressure" method has limited success in balancing coal flow and often restricts primary air flow to the point where coal layout can occur in the piping and burners. We have found that distribution will only be improved to the extent that it was caused by the primary air imbalance.

Since the momentum of coal particles is significantly higher than air, it would logically follow that you need to control the coal particle before it enters the pipe. This is exactly what we have done with the PF-Distributor™.

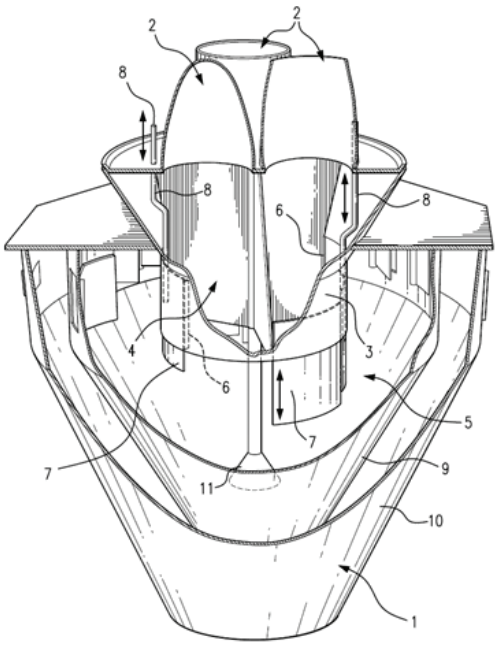
PERFORMANCE RESULTS

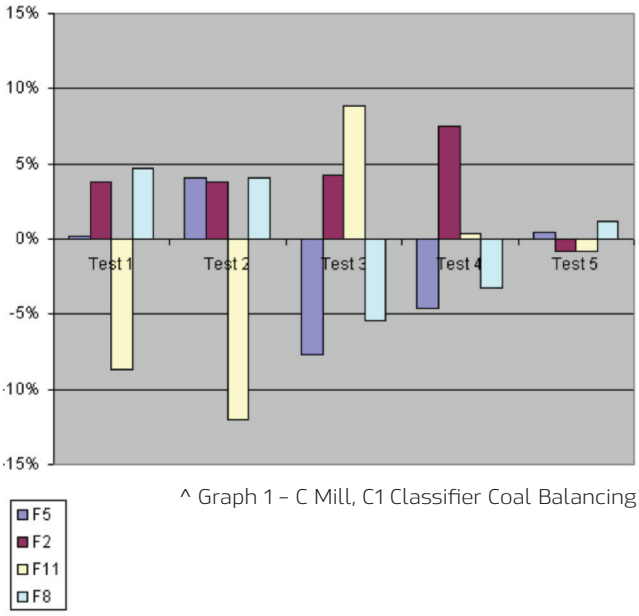
Post retrofit testing was performed utilizing ASME coal fineness sample test procedures. Initially, the Model 80 classifiers were tuned for optimum fineness. Coal distribution tests followed. A baseline test was conducted with the distributor in the "zero", fully retracted position. Incremental adjustments were made to extend the distributor segments downward.

The baseline coal balance for A & B mills was very good without any adjustment and fell within the relative accuracy of our test method. Several adjustments were made to the A & B mill and distribution was not improved significantly, so the PF-Distributors were returned to their zero positions.

The baseline test of the C1 classifier had the most significant imbalance. The PF-DistributorTM was adjusted in several tests as shown in Graph 1 data. The final set point had a pipe to pipe deviation of +/- 0.8%.

Graph 1 shows Mill C fineness test iteration results from before (left) to final (right). The "F" key denote the fuel pipe designation.





^ Graph 1 – C Mill, C1 Classifier Coal Balancing