

# CoalFlo<sup>®</sup> Damper

## Pulverised Fuel Balancing Device

The PF Balancing Solution for Multi-Outlet Mill and Classifiers



“Enhancing the performance of our  
customers plant & equipment”

# Greenbank

## Pulverised Fuel Balancing Device

### Product Overview

#### Reliable, Controllable and Dynamic PF Flow Balancing

Balancing the flow of pulverised coal and biomass fuels (PF) from multi-outlet mill classifiers is generally hindered by differing pressure drops across the multiple pipelines which convey PF to the burners.

As each pipeline takes a different route to the boiler and connects to a different burner, it is inevitable that some pipelines will be longer than others and some will have more complex changes in direction.

Assuming the mill and classifier are performing well and the piping system is well maintained, the air and finer PF particulates will take the easiest route out of the classifier, this being the pipeline with the least resistance.



Furthermore, changes to the loadline, fuel type and particle size, plus deterioration (wear and tear) of the piping system, valves, milling and classification plant, can each affect the pressure drop in any particular pipeline.

As pressure drop is therefore dynamic, it is necessary to provide some form of adjustable orifice which compensates for the differences in individual pipelines and any subsequent changes or variation to pressure drops.

#### Significant Benefits of the CoalFlo® Damper

- Balances pressure drop across multiple PF pipelines
- Optimises PF distribution from mill to burners
- Capable of dynamically balancing PF flows as flow conditions change.
- Helps reduce excess carbon-in-ash and NOx through improvement to stoichiometric conditions.
- Helps disburse PF roping

Historically, fixed orifices in the form of intrusive orifice plates have been used to balance the pressure drop across pipelines.

These, however, are only good for one set of conditions, generally that of design or clean air. Once the plant is in operation, not only do the conditions change but the orifices quickly erode and, hence, fail to perform.



Adjustable orifices such as knifegate or orifice valves have also been used to try and compensate for changes in conditions, but these have a poor record of success as they often seize, erode quickly or reject PF due to flat surface intrusion, again failing to perform effectively. Greenbank's CoalFlo® PF Balancing Damper addresses all the issues pertinent to dynamic changes in PF pipelines.

Having aerodynamic vanes, actuated on a spindle, the damper allows PF and air to flow past smoothly whilst gradually increasing the pressure drop in the pipeline as the damper blade is opened.

Coupled up with the Greenbank PF monitoring system, it is possible to have the optimise CoalFlo® Damper accordance with dynamic changes to flow conditions

#### CoalFlo® Damper - Better by Design

- Designed specifically for PF flow balancing of multi-outlet mill/classifiers arrangements
- Bespoke design for individual applications using CFD
- Suitable for manual or actuated closed-loop operation
- Nonseizing spindle operation
- Negligible pressure drop in open position.
- Complies with PF code of practice
- Fully lined for extended maintenance intervals
- Fully refurbishable.



“It is our vision to excel and lead the world in our area of expertise”

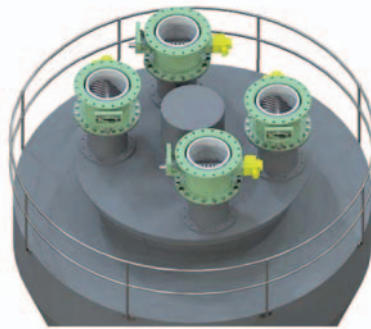


# Design Philosophy

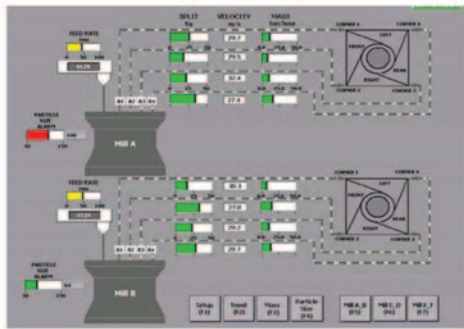
## Advanced Pf Flow Control

Greenbank's CoalFlo® Balancing Damper has been specifically developed to overcome the difficulty of balancing the air and pulverised fuel (PF) down multiple pipelines from pulverising mill classifier outlets where differing pressure drops in each pipeline create an unequal flow of air and PF to the burners, propagating poor combustion.

Greenbank's CoalFlo® PF Balancing Damper has its design refined for each specific application. The goal, using CFD analysis to design, is to equalise the pressure drop in each classifier outlet pipeline without rejecting PF.



## Interactive Online Capability



The CoalFlo® Damper can be installed and optimised manually to balance PF flows in individual pipelines under varying load conditions. The CoalFlo® Damper can also be actuated remotely using air actuators and positioners.

Fitted to multiple outlet pipelines and used in

conjunction with an online Greenbank PF flow monitoring system, it can become an intelligent closedloop balancing system whereby the actuators which position the damper blade are adjusted to balance the inherent pressure drop in each pipeline at any point in time.

Having an online PF flow monitoring system connected to a DCS or a Greenbank bespoke control panel, the actuators can position the damper blades to equalise the pressure drop and the flow in the pipelines.

## Robust, Low-Maintenance Design

The design of the valve utilises over 60 years of Greenbank's experience in the provision of PF systems and valving. The ductile steel-fabricated body is designed and tested to withstand pressure excursions in line with international PF code of practice.

The dampers are flanged for ease of connection and removal. The internals are protected with high quality wear protective linings and the blade is cast from an abrasion-resistant alloy.

Having a robust design and sealed self-aligning bearings ongoing maintenance is negligible, and the dampers life expectancy is that of a normal period between major plant overhaul shutdowns. The dampers can be fully refurbished and the linings and blade replaced with ease.



# Greenbank

## Pulverised Fuel Balancing Device

### General Specification

**Size Range:**

6" through 60"

150mm through 1525mm

**Working Pressure:**

7.25psi

48kPa

**Design Pressure:**

50psi (200psi min yield)

1379kPa (345kPa min yield)

**General Design:**

NFPA8503

GD CD 215

**Flange Designs:**

DN200 DIN1600

Certified Carbon

BS EN/ANSI/ASME/API/DIN/JIS

Bespoke Design

**Damper Body:**

Certified Carbon Steel Body

**Damper Linings (from):**

Zalcon, Alumina Zirconium Casting

Alumina

Cast Basalt

White Cast Iron

**Damper Vanes (from):**

White Cast Iron

Zalcon, Alumina Zirconium Casting

**Bearings/Seals:**

Labyrinth Seals

Stainless Steel Self Aligning Seal

**Actuation (options):**

Manual Lever

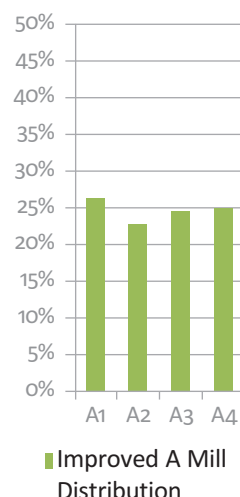
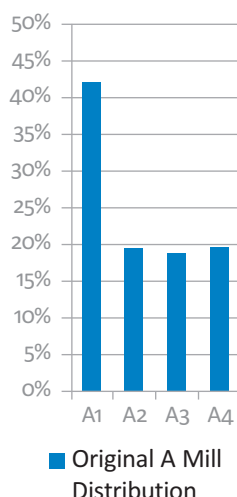
Air Cylinders

Hydraulic Cylinders + Positioner

Electric Motor

**Typical Distribution Performance Improvements**

Expected by Installing CoalFlo® Balancing Dampers



### Closed Loop Control Option

The control damper position is automatically positioned according to information read from plant conditions. It operates on the theory of balancing back pressures to equalise air flow.

The control system can also accept data from other measuring devices, such as mass flow monitors or pressure transducers and use this information to improve the feed back process.

The system also allows for on-site calibration against manual sampling.

