



STOCK GRAVIMETIC COAL FEED SYSTEMS

MICROPROCESSOR CONTROL UPGRADES

ADVANTAGES

Reduced Maintenance and Improved Availability

All components associated with the weigh lever assembly are eliminated and replaced by two load cells; therefore, replacement and maintenance of the balance beam pivots, bearing blocks, and poise weight motor will no longer be required.

The leveling bar actuator with motor, the balance switch assembly with mercury switches and movable leveling bar and shaft are removed and replaced with a fixed height leveling bar. The increased height of the leveling bar (from a range of 3-1/2" to 5-1/4" to a fixed 7") greatly increases belt life and helps prevent foreign material blockage. By opening the feeder inlet, frozen coal and large lumps will typically pass. This prevents blockages and lowers the belt speed by about 1/3 to extend belt service life.

The STOCK microprocessor is utilized for weight and belt speed measurement to allow a simpler, yet more comprehensive calibration procedure. Poise adjustments are eliminated and replaced by electronic measurement of the belt tare weight, belt speed and load cell span. Calibration parameters are measured and stored automatically in a two-step procedure through an alpha-numeric, user-friendly keyboard, reducing the calibration time by more than 50 %.

In the event of a weighing system malfunction, the feeder automatically reverts to volumetric operation. Only severe malfunctions cause the feeder to trip. Relay outputs annunciate adverse feeder conditions to the control room while alpha-numeric error messages are provided at the keyboard display to assist in trouble shooting in the event of unfavorable operating conditions.

Improved Accuracy and Operating Efficiency

The microprocessor control with electronic weigh system provides an immediate response to variations in density or demand changes since the feed rate is continuously compared to the demand rate. As the demand rate or the density changes, the belt speed is controlled to provide instantaneous corrections in the feed rate. A feed rate accuracy of $\pm\frac{1}{2}$ of 1% is reached in 1/10th the time, resulting in consistent fuel flow.

STOCK EQUIPMENT COMPANY

Advantages, Microprocessor Feeder Conversions

The mechanical weigh beam feeders return a fuel flow feedback signal based on feeder motor speed. The feedback signal is accurate only if the mechanical system is in balance and does not account for coal blockages or leveling bar system failures. The "as-found" accuracy of feeders with mechanical weighing systems is typically $\pm 2-3\%$. The MPC fuel flow feedback signal from the feeder to the combustion control system represents the true integrated feed rate of material through the feeder, representing both belt speed and fuel density, to within $\pm \frac{1}{2}$ of 1%. The improved accuracy assists operators in a closer matching of fuel-to-air ratios to prevent stack losses when the primary air is excessive or to prevent unburned carbon in the ash, reducing LOI, when the primary air is insufficient.

The panel display can indicate, as selected by the operator, the feed rate in tons per hour, the belt drive motor RPM, or the density of the material on the belt. Totalized weight of material delivered is displayed as gravimetric, volumetric, or a total of both, as selected. All feeder parameters are displayed with the selected engineering units.

Improved Fuel Accountability

Human error is reduced during the calibration process with the microprocessor conversions since there are no operator adjustments. The calibration process involves an actual measurement of the belt travel over the weigh span. The mechanical weighing system typically is only set at the factory during the assembly of the feeder components. This belt travel measurement reduces the error associated with belt travel by as much as 50 %, which significantly improves the weighing accuracy of the feeder.

In the event a coal blockage occurs above the feeder inlet, the microprocessor feeder will speed up the belt drive motor to meet the feed rate demand or give a feed rate alarm if the demand can not be met. During alarm conditions, the feeder continues to accurately weigh within $\pm \frac{1}{2}$ of 1% whatever coal is delivered over the weigh system regardless of how much blockage occurs.

The microprocessor continually checks and compares the load cell output signals during operation. If the signals are not within a specified range, (indicating a malfunction in the weighing system) the feeder is switched to a volumetric mode. The volumetric total is based on material density stored in the microprocessor memory. This total is kept separate from the gravimetric total so that the accuracy of the true weight is not compromised.

Conclusion

Stock Equipment Company has extensive experience in providing microprocessor conversions and variable frequency drives. These conversions have proven that these upgrades to state-of-the-art technology have reduced the overall costs of feeder maintenance, improved operation efficiency, improved the accuracy of fuel accountability and avoided obsolescence. These advantages have proven to be increasingly important as our customers meet continuous challenges to reduce operating costs, reduce emissions and improve unit availability.