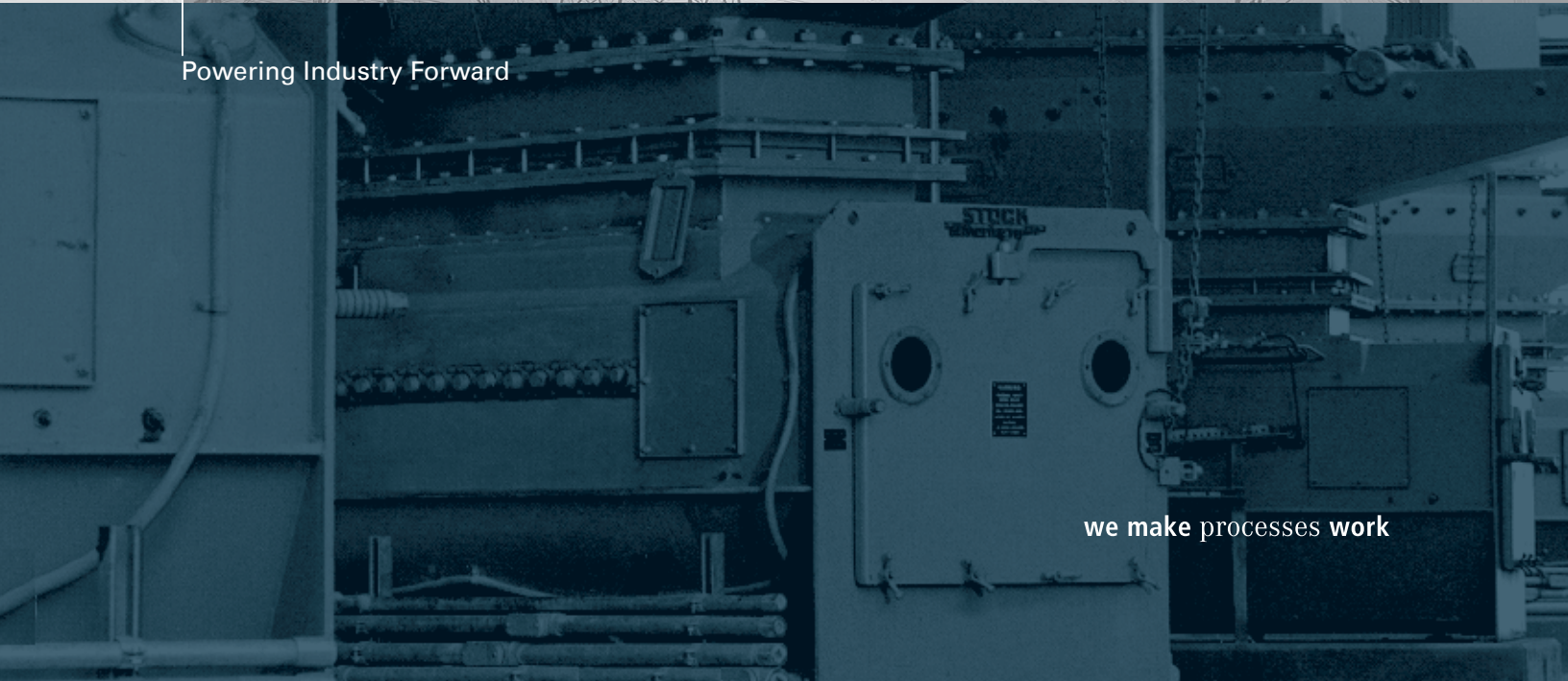


# Stock Coal and Limestone Feed Systems



Powering Industry Forward



we make processes work

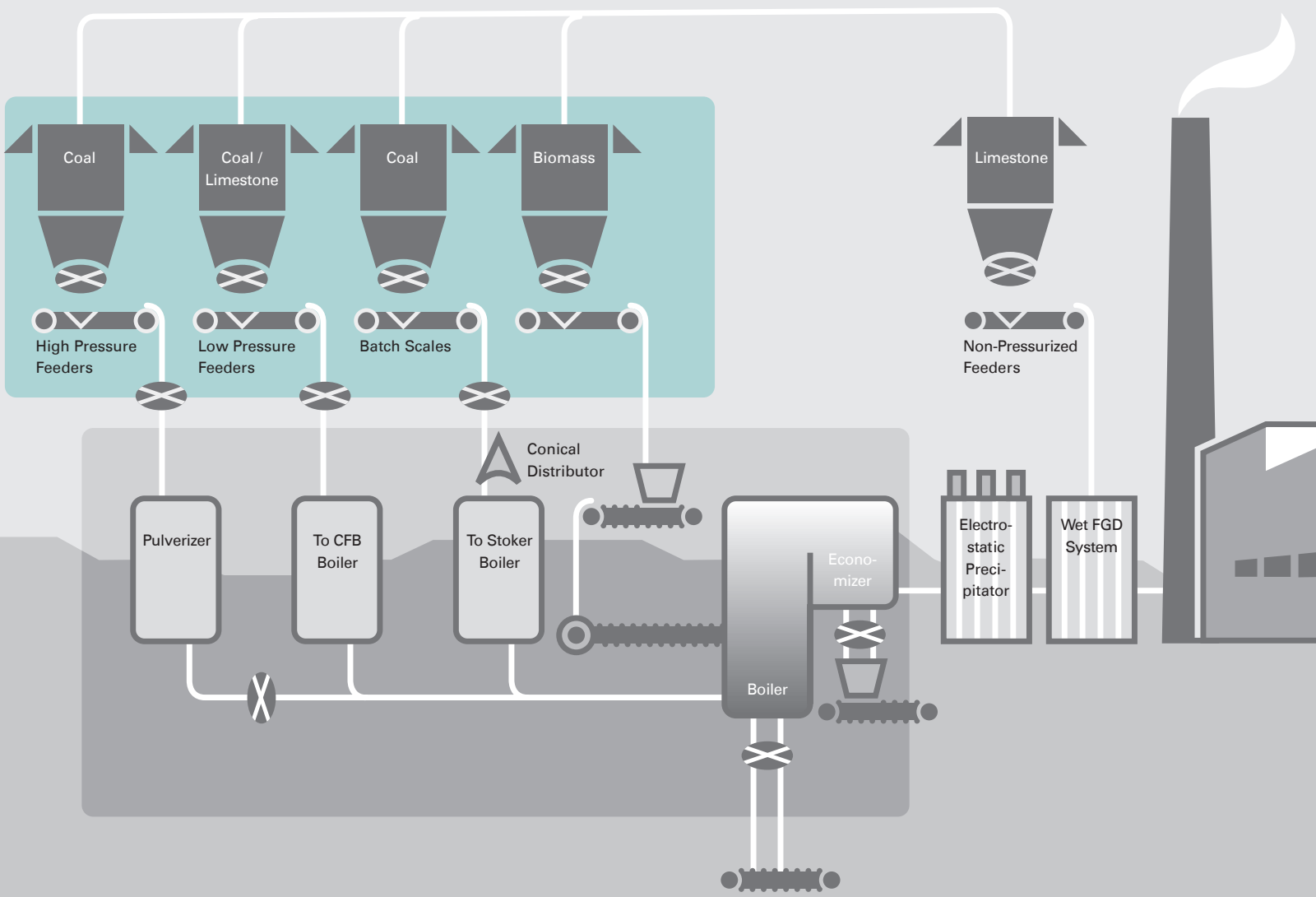
# Coal Feed Systems

Powering industry forward with the world's most trusted and dependable bulk material handling and environmental systems.



## Five Ways to Use Stock Feed Systems

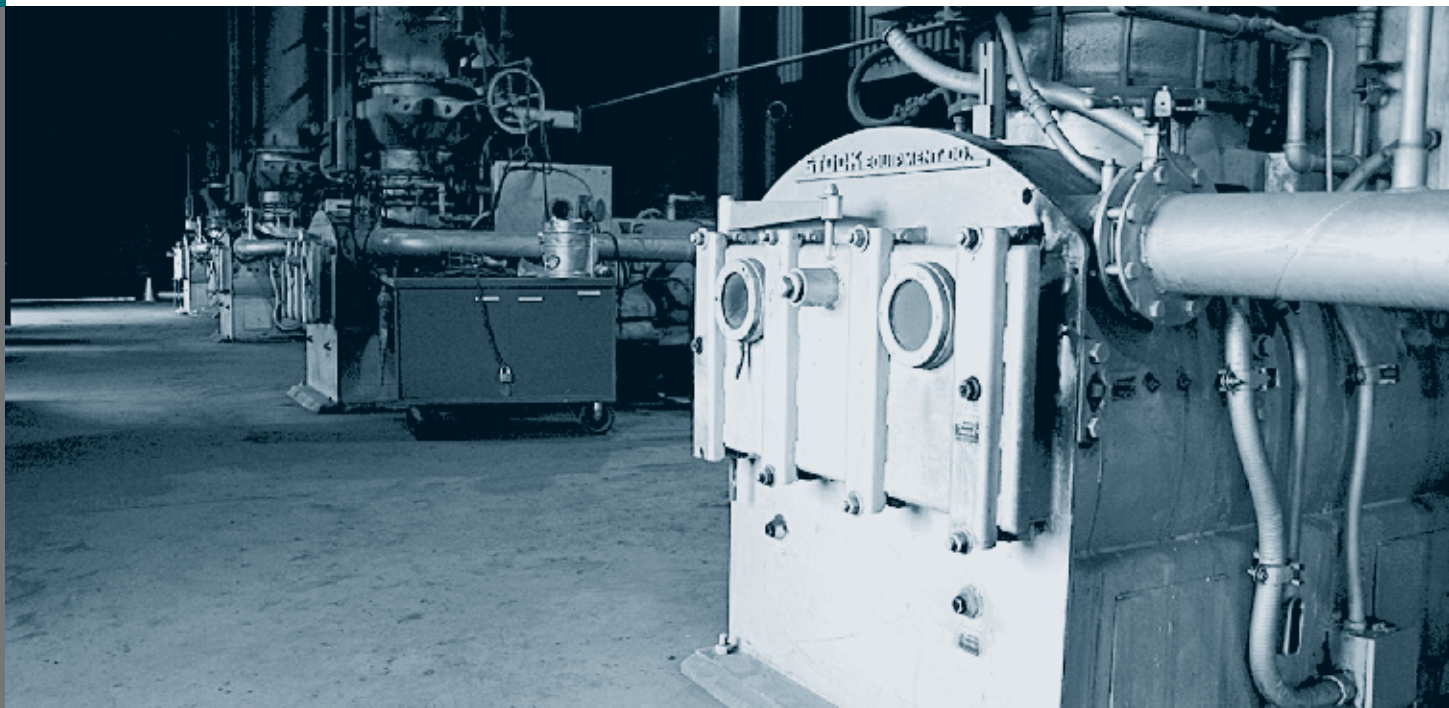
1. The majority of worldwide power boilers use pulverized coal. Stock High Pressure Gravimetric Feeders reliably and accurately deliver raw coal to each pulverizer in exact response to boiler fuel demands.
2. Utilities and Independent Power Producers specify Fluidized Bed Boilers for a growing number of installations. Stock Low Pressure Gravimetric Feeders deliver traditional coals, lignites and refuse coals directly to the combustors, with front and rear wall feed systems adapted to the distinct needs of this type of boiler.
3. Stoker Boilers are still in common use for single and multiple fuel applications. The Stock Batch Scale provides a precise flow of coal at exactly the usage rate and totalizes the quantity over time for accounting and economic purposes. Stock's Conical<sup>®</sup> Nonsegregating coal distributor provides a uniform mixture of coarse and fine coal across stoker hoppers ensuring even combustion while minimizing fines accumulation and the potentially associated explosive situation.
4. Processed Biomass is more and more evident as a preferred or alternate fuel, best fired into stoker or bubbling bed boilers. Stock Non-Pressurized Gravimetric Feeders or Batch Scales bring traditional feedrate and totalization accuracy to the new challenges of biomass feed.
5. Boilers of all types are likely to have Flue Gas Desulfurization (FGD) Systems and whenever limestone or lime is the reagent, Stock Non-Pressurized Gravimetric Feeders give direct control of material usage, for exact mixing or injection into the critical gas cleaning process.





# Stock Fuel Feed Systems

Ensure Reliable, Accurate and Uninterrupted Material Flow



## Why Gravimetric Feeding of Coal?

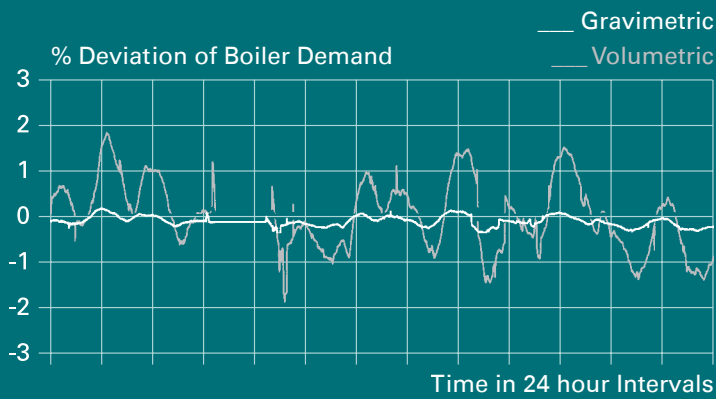
Because of its non-homogenous nature, coal properties constantly vary with respect to sizing differences and the adverse impact of moisture on heating value, flow characteristics and density. The effect of moisture on coal has been studied for many years by Stock, research institutes and other experts who have published data illustrating how coal bulk density changes with different total moisture levels. Since there is currently no effective way to measure BTU heat content flow rate, this value must be inferred from either volume or weight flow.

The Gravimetric Feeder compensates for the variation in bulk density by feeding a fixed weight of coal in response to a boiler demand. This ability to accurately weigh the coal on an "as-fired" basis provides significant improvement over volumetric feeders in terms of matching the BTU delivered by the feeder to the actual process energy required on coal fired units (see graph on next page). In order to optimize boiler performance, achieve lower emissions and realize the resulting cost savings, Stock's gravimetric feeders have become the industry standard in coal fired power plants.

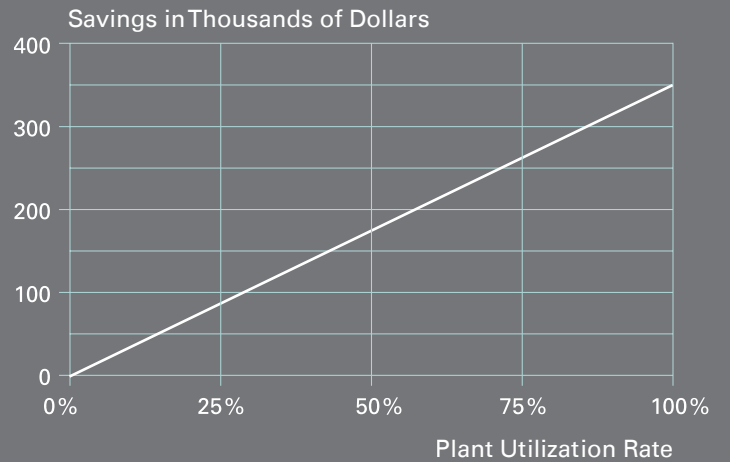
## Summary of Benefits

- ⊕ Fuel savings through improved boiler efficiency.
- ⊕ Improved combustion efficiency/loss on ignition.
- ⊕ Improved pressure and superheat control.
- ⊕ Less slagging and fouling.
- ⊕ Stability and improved response of combustion controls.
- ⊕ Less NOx through better control of excess air.
- ⊕ Improved pulverizer/cyclone/combustor performance.
- ⊕ Less corrosion.
- ⊕ Reduced Operations & Maintenance costs.
- ⊕ Safety with NFPA 50 psi body shell.
- ⊕ Economical compact design.

### Boiler Fuel Input Deviation



### Annual Savings Potential with Stock Gravimetric Feeders



# Evolutionary MPC Controls



## **Weighing Accountability**

Stock Equipment Company's DISOCONT® Tersus (DT-9) feeder controller provides accurate and reliable weigh feeding by utilizing the latest in micro-processor technology. The DT-9 controller maintains all the functionality of past feeder controls, but combines it with updated technology to provide the new standard in weigh feeding control. The interactive touch-screen display shows a graphical representation of the feeder in operation with details pertaining to the feedrate, setpoint, belt speed, belt load and the total weight of the material.

The DT-9 supports fieldbus communication technologies. By using systems such as Modbus, Ethernet, Profibus or DeviceNet, plants can put their equipment on a network allowing for remote diagnostics and the delivery of information directly to the control room. Two control boards, each with their own processors provide added capability. Incorporated EasyServe software allows plant personnel to use their laptops to configure, troubleshoot, back-up and restore feeder configurations. Plants can customize their feeder control scheme and integrate the feeder with auxiliary equipment and sensors.



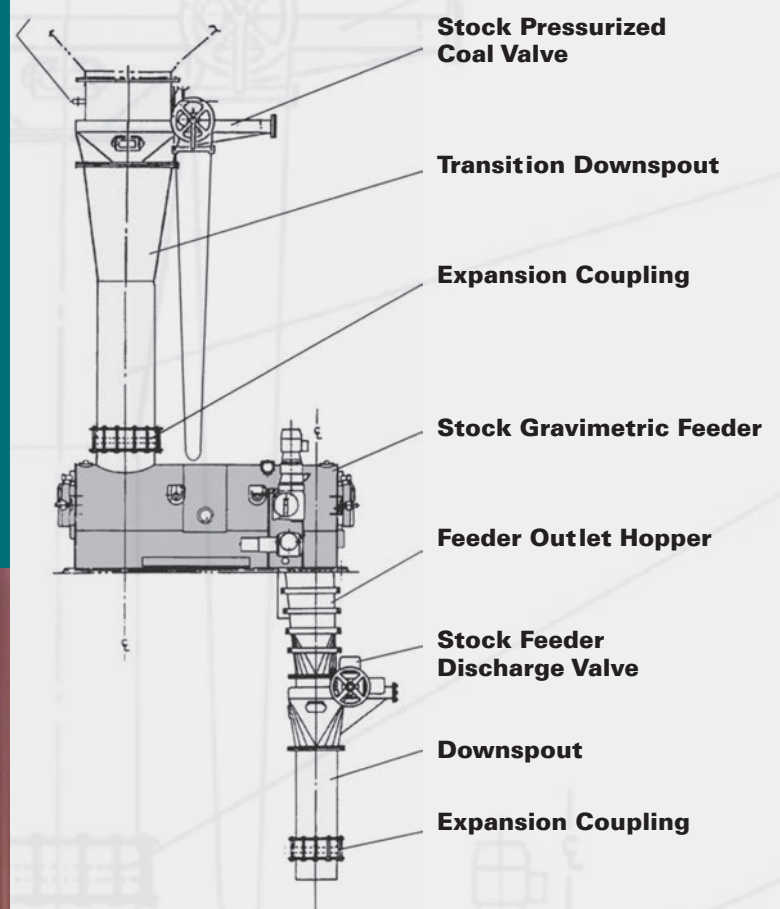
## Features include

- ❖ Large, color, graphic touch screen display.
- ❖ Dual processors for added capability.
- ❖ Fieldbus communications options.
- ❖ Flexible design allows for configurable inputs/outputs.
- ❖ EasyServe PC interface for configuration back-up and restore.
- ❖ Simple access to information from control room.
- ❖ Integrated clean-out chain control.
- ❖ Powerful 32 bit ARM-9 processor.
- ❖ Maximum/minimum feedrate limit setting.
- ❖ Modbus, Profibus, Ethernet support.
- ❖ Scheduled maintenance reminder.
- ❖ Belt slip detection algorithm.
- ❖ Moisture compensation Input.
- ❖ Remote/local Mode.
- ❖ Forward/reverse, jog/run.
- ❖ Internal PID control settings.



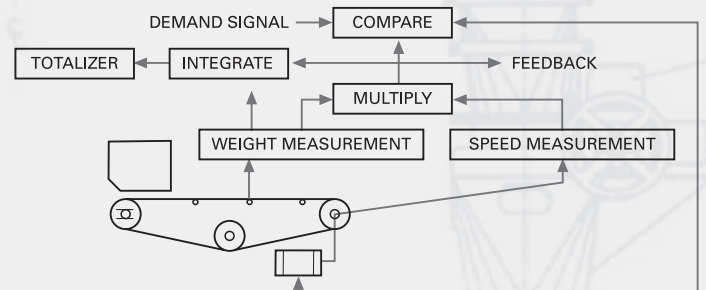
- ❖ Belt motion monitor input.
- ❖ Discharge pluggage sensor.
- ❖ Coal on belt switch Input.
- ❖ Coal flow monitor input.
- ❖ Feedrate analog input/outputs.
- ❖ Multiple language support.
- ❖ Integrated clean-out chain control.
- ❖ Variety of display and configuration units.
- ❖ Configurable error and warning reporting.
- ❖ Hourly/daily feedrate totals.
- ❖ Settings and I/O for calibration probes, calibration weights and belt travel.
- ❖ Automatic switch to volumetric feed upon load cell failure.
- ❖ Raise/lower feedrate inputs.
- ❖ Three totalizer outputs.
- ❖ Pre-feeder start output.
- ❖ Release output for integration of auxiliary equipment.

## Acoustic Flow Monitor



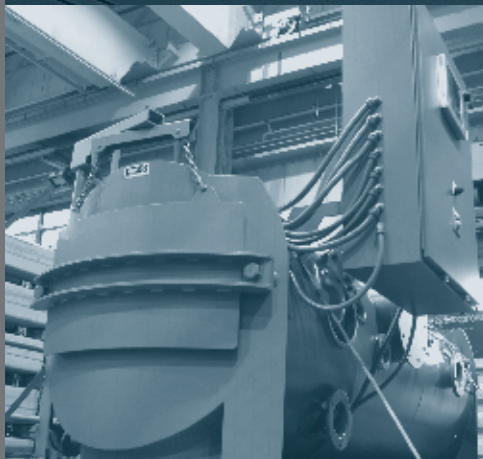
## Gravimetric Feeder Principle

- ❖ The gravimetric feeder weighs material on a length of belt between two fixed rollers using a weighing roller suspended from load cells.
- ❖ Belt speed is determined by a tachometer attached to the motor shaft. A microprocessor multiplies the speed and weight signal to arrive at the feeder output material flow rate.
- ❖ The microprocessor continuously matches the feeder output to the demanded output by adjusting the feeder motor speed.



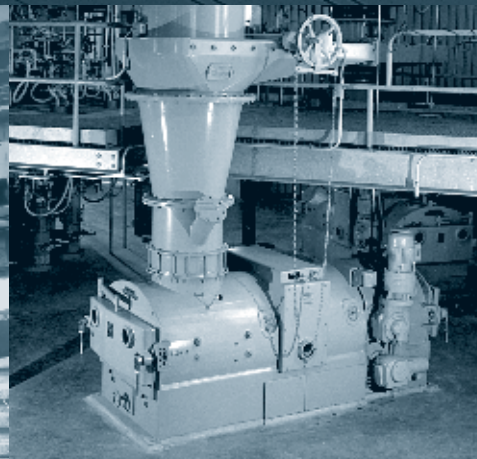
# Stock® Offers Many Options to Solve Your Fuel Feed Problems

**MULTIDOS® HPG**



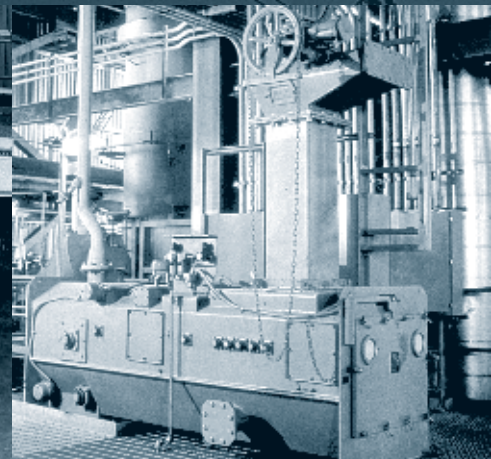
The MULTIDOS® High Pressure Gravimetric (HPG) Feeder is the next generation in Stock Equipment's line of feeder models. Stock has retained the proven gravimetric feeding technology which has been providing reliable and accurate performance in power plants since the 1930s. This dependable technology coupled with updated design elements makes the MULTIDOS HPG feeder the prime choice for material feeding solutions. The tension roll and active tracking station maintain belt alignment. A reversible inlet promotes mass flow even in reverse when other bunker emptying options are not practical. Drives can be re-configured for left or right hand in the field if necessary. The round outlet hopper meets 50 PSI requirements and promotes improved coal flow. A composite clean-out chain improves cleaning efficiency and reduces the possibility of metal falling into the mill. All internal surfaces are sloped or rounded to avoid coal build-up which is optimal for PRB applications.

**EG 50**



Stock's EG50 (Electronic Gravimetric 50psi/3.5 bar g) pressurized feeders are the heart of the Stock feeder line. The EG50 series is the best choice for pulverized coal fired boilers requiring feeders that can withstand high pressures, provide high safety and produce high accuracy coal feeding. The Stock EG50 can produce fuel savings, improve boiler efficiency, reduce slagging, provide better control of NOx and improve feed system response compared to non-gravimetric feed systems. The EG50 was researched, developed, designed, tested and manufactured by Stock®, specifically for the Utility and Industrial Power Industry. The EG50 Series is built to be reliable and accurate to  $\pm 0.5$  of 1 % of the total coal flow, verified in Stock's own full scale material test facility. Several models are available, with lengths, widths, and accessories suited to the specific needs of new or renovated plants.

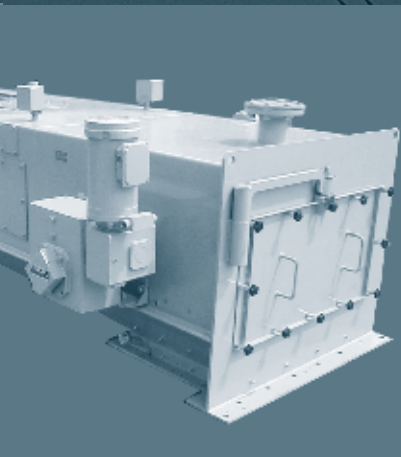
**LPG**



The primary function of the Stock Low Pressure Gravimetric Feeder (LPG) is to provide uniform and precise fuel and limestone delivery by weight to the combustor, matching the demand for heat release in the boiler. Accurate fuel delivery ensures stable combustion control and a rapid response to changes in boiler load. The Stock LPG feeder is designed to provide uninterrupted fuel delivery with a feed rate accuracy of  $\pm 0.5$  % as proven in full-scale material tests. In order to achieve this accuracy and reliability, Stock has designed the LPG feeder utilizing rugged components and features which will lend themselves to a system that will operate, for the life of the plant, in harsh power plant environments. Many of these features are unique in the industry.

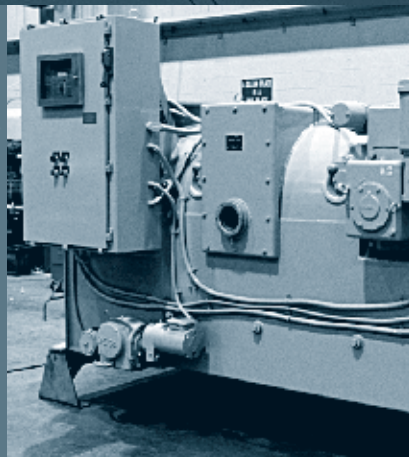


**NPG / DMO**



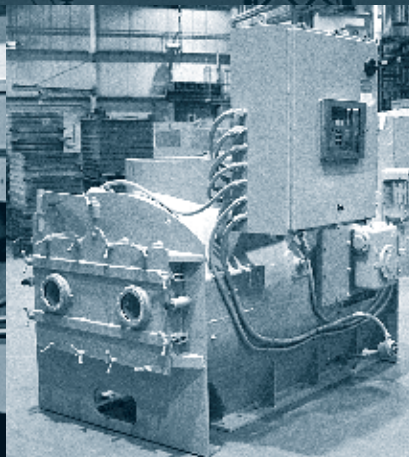
For Limestone Feed to FGD Systems or Other Inert Material Applications, Stock has developed feeders for controlled feed applications of bulk materials, utilizing the most advanced weighing and delivery technology in the material handling industry. These feeders, the Stock Non-Pressurized Gravimetric Feeder (NPG) and the DMO offer dust tight operation with weighing accuracy to within 0.5 %. Standard belt widths are 24" to 54" while special designs up to 84" are available. Feed rates up to 500 tons per hour are standard with higher capacities available.

**Composite / Dual Belt**



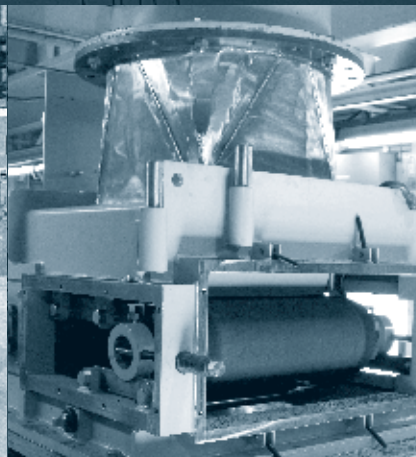
The historic difficulty in supplying gravimetric feeders to replace mechanical volumetric styles has been the available offset in existing bunker-pulverizer geometry. Stock has developed feeder designs to overcome arrangement difficulties, while minimizing impact on plant structures. The Composite Gravimetric Feeder uses a standardized upper gravimetric module to weigh and meter the fuel and provides a chain conveyor in the lower section to accommodate offsets. The Stock Dual Belt Feeder again uses the standardized upper gravimetric module but uses a second belt in the lower module to deliver the coal back to the discharge point of the feeder outlet hopper.

**CGF**



The Compact Gravimetric Feeder (CGF) is the newest and shortest, microprocessor controlled gravimetric feeder produced by Stock. This innovative feeder will dramatically improve the power plants' fuel feed performance, while requiring minimum space and impact on existing structures. Ideal for retrofit applications to replace non-weighing volumetric feeders. Just like the rest of the EG50 style feeders, many proprietary advantages are standard, including Stock's V-guide tracking system, AccuFlex® belt, and evolutionary MPC control. With over nine thousand installations worldwide, Stock's gravimetric feed systems represent the standard for coal feed systems.

**Volumetric / CVF**



For those applications where weighing the coal is not desired, Stock volumetric feeders are designed to reliably and safely deliver coal to the boiler and are built in the same tradition as the Stock gravimetric feeder. They are both built to deliver many years of dependable service. This tradition is demonstrated by the thousands of Stock feeders installed worldwide. Stock's new Compact Volumetric Feeder (CVF) utilizes a short offset to fit into restricted areas. Ideal for replacements of table, pocket and drum feeders, it will achieve reliable, consistent feed rates with minimum maintenance. Our extended warranty ensures expense free operation. Custom designed systems are available to suit a wide range of bunker outlets, varying mill inlet centers, rates up to 70 tons/hour and design pressures.

# **PASS – Service you can rely on.**

**PASS: Process Advanced Service System**



Working closely with technical and production specialists from diverse industries, we've created support programs to ensure efficient, reliable performance year after year. Because we design, manufacture, install and commission our products, we have the expertise it takes to back our equipment with a lifetime of support. With genuine Stock replacement parts, on-site service engineers for field service support, and managing complete turnkey projects, Stock has you covered.

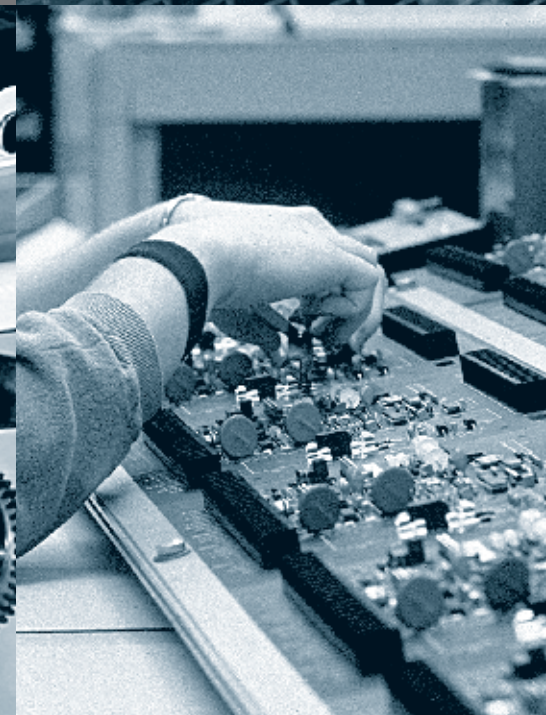
Quality and reliability are the cornerstones of our company's philosophy. That is why we consider a comprehensive service concept simply par for the course, from strict quality control, installation and commissioning to seamless support across the entire product life cycle. With over 30 service stations and over 180 service specialists, you can count on us to be there whenever and wherever you need us. It doesn't matter where you are, our specialists are there to advise and assist with the best in worldwide, personal, comprehensive service.



**Individual, reliable, competent – Industry specific solutions to meet your requirements:**

- ❖ FitnessChecks, Inspections & Reporting
- ❖ Equipment & Controls Training (Site Specific)
- ❖ Chain Testing for Feeder Accuracy
- ❖ Spare Parts Quoting & Inventory Programs
- ❖ Feeder Upgrades, Conversions & Rebuilds
- ❖ Product Enhancements
- ❖ Maintenance Agreements
- ❖ Turnkey & Installation Services
- ❖ Upgrade Kits & Installation
- ❖ Consulting & Training
- ❖ Engineering Studies
- ❖ Equipment Upgrades & Conversions
- ❖ Structural Inspections
- ❖ Software Upgrades

- ❖ To meet the expanding needs of our customers, Stock provides field installation of our equipment resulting in single point responsibility for the entire project. No one knows more about our equipment than Stock.
- ❖ Serving customers worldwide means having the resources and logistics to deliver exceptional customer service around-the-clock, even at great distances.
- ❖ Everyone in our organization clearly understands that our success depends completely on the quality of customer service we provide.

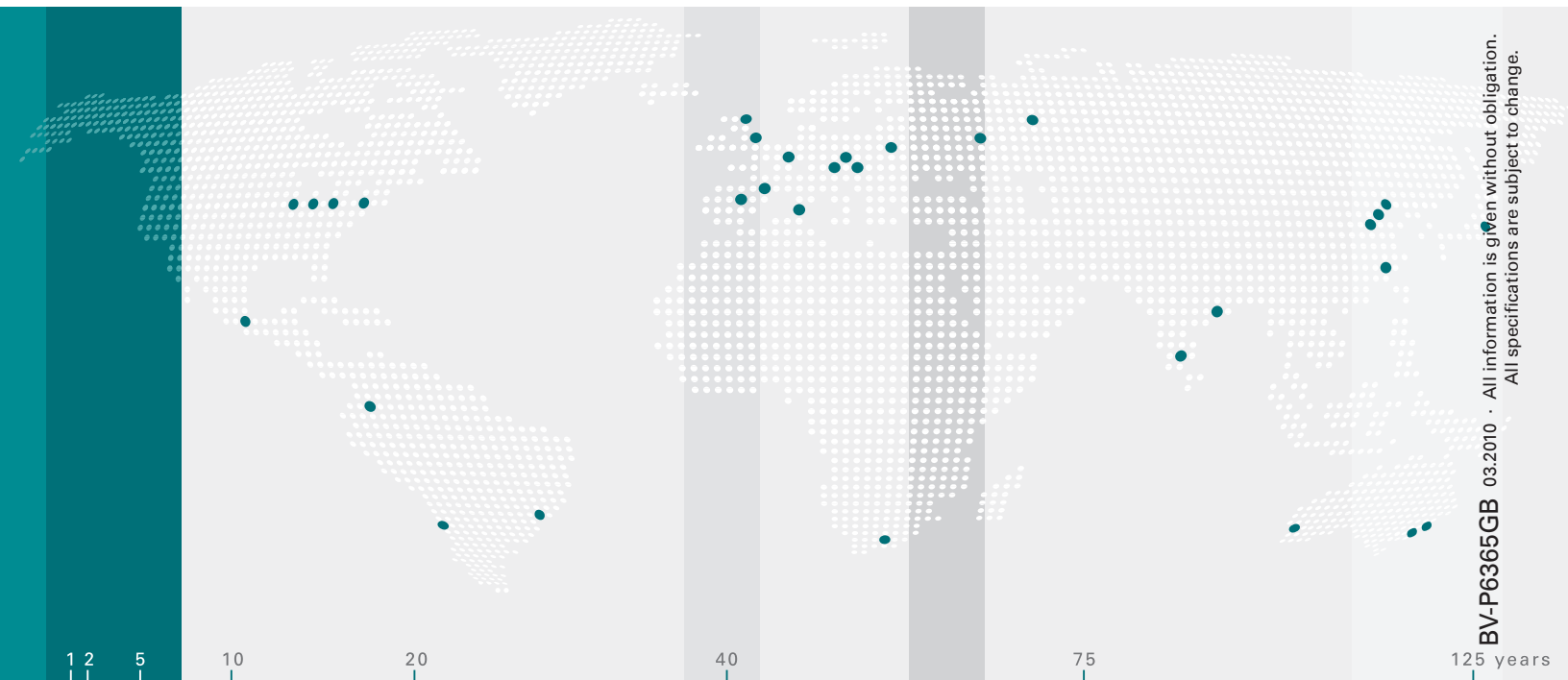


**weighing**

**feeding**

**conveying**

**automation**



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All specifications are subject to change.

Stock Equipment Company is the global market leader of solutions for the power industry, supplying complete bulk material handling and environmental system solutions.

Stock Equipment Company develops, manufactures and markets a full range of solutions, products and systems on the basis of combining process engineering expertise, reliable components and field-proven technology.

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**we make processes work**