

# POWER GENERATION



## COAL FIRED **POWER**

Coal Fired Power plants will continue to play a key role in the generation portfolio of most power companies, even while facing political pressure and competition from other energy sources. While there is no denying the renewable market is growing worldwide, older coal plants are being upgraded, and more efficient coal plants are being built to remain online for decades to come.

It is anticipated that world coal consumption will surpass oil consumption by 2020. It has become a priority for operators of existing/older coal plants to look constantly for new technology to improve operations and efficiency, thereby reducing greenhouse gas emissions, and allowing plants to stay online longer.

# ELECTRAULIC™ ACTUATION

# Coal Fired Power Generation

At REXA, we have more than 20 years of experience in the Coal Fired Power market. We offer high-quality, low maintenance Electraulic™ Actuators that have been field-proven in some of the most critical and difficult applications:

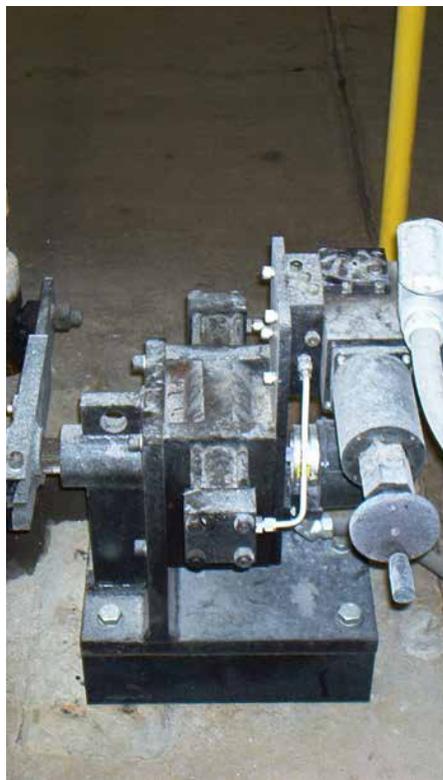
- Forced draft, induced draft & primary air dampers
- Main feedwater/recirculation control
- Supercritical startup valves
- Burner tilts
- Attemperator spray valves
- Sky vent valves
- Steam drains
- Sootblower valves

## Why REXA?



### Feedwater Recirculation Valve

- Precise control: 0.05% Resolution
- Tight shutoff
- Hydraulic stiffness
- Fail-safe capable



### Primary Air Damper

- 50-70mSec deadtime
- Custom mounting
- Zero hysteresis
- Low power consumption
- 100% Duty cycle



### 201 Startup Valve

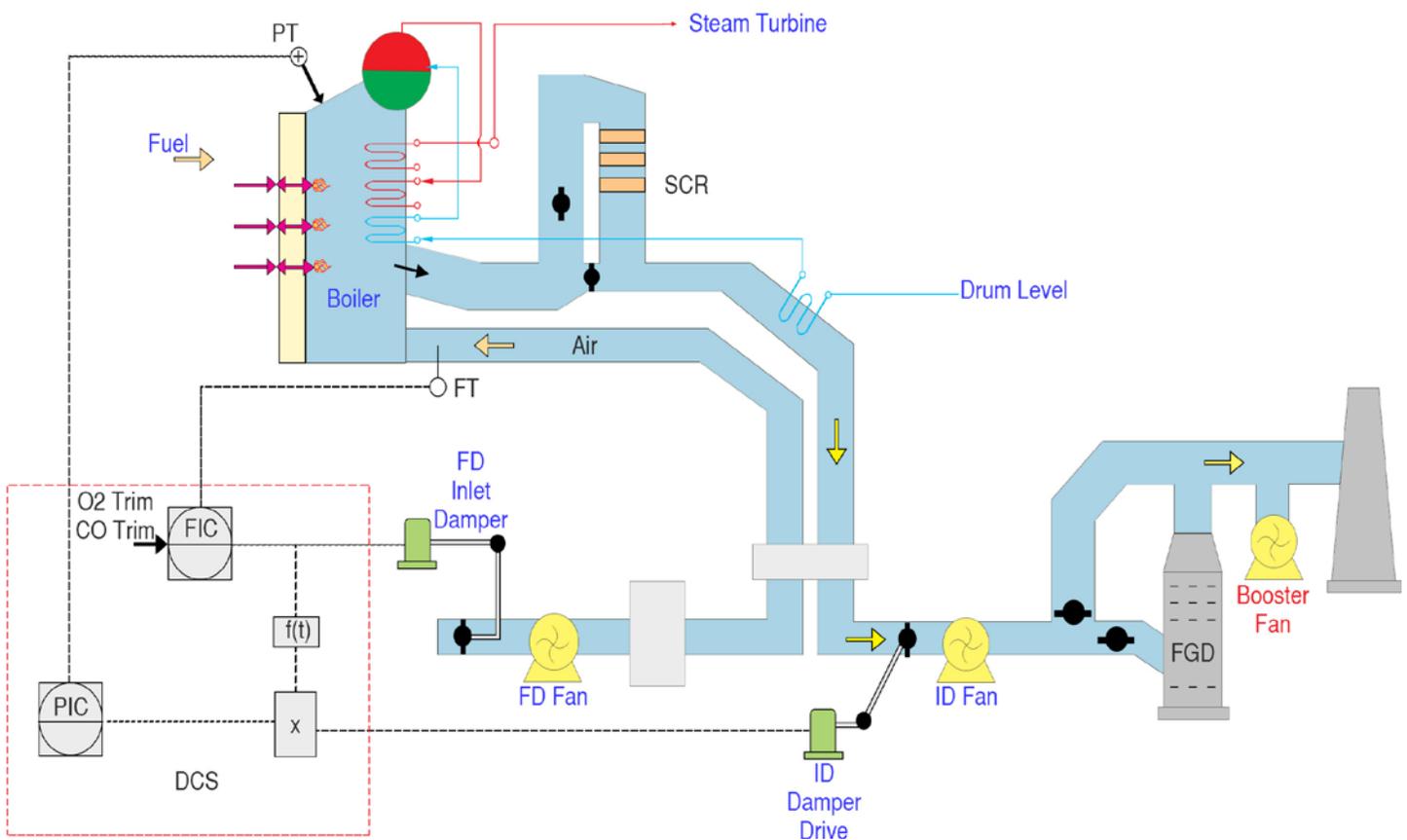
- Tight shutoff
- 5 Hz frequency response
- Deadband to 0.05% Span
- <0.1% Resolution
- 250°F (121°C) temp rated

*"After upgrading to REXA on my boiler outlet pressure control valve, I actually started up my plant in Auto Mode for the first time in 15 years."*

# Coal Fired Damper Control

Furnace draft pressure control is the heart of complete combustion, reduced fuel consumption, and increased plant efficiency. Pulverized coal fans and dampers are the key elements in making all of this happen. Primary Air (PA) fans deliver the required fuel from the pulverizers to the furnace to meet generation demand. In a balanced draft arrangement, both Forced Draft (FD) and Induced Draft (ID) fans are used to control air and combustion gas flow through the boiler. The most common, balanced draft systems operate slightly below atmospheric pressure to ensure safe operation and the removal of flue gas from the furnace. Inadequate FD/ID operation negatively affects the performance of low NO<sub>x</sub> burners that have narrow limits for flammability and need precise fuel/air ratios to work as designed. Poor damper performance, along with inadequate pulverization, are the main contributors of increased fly ash.

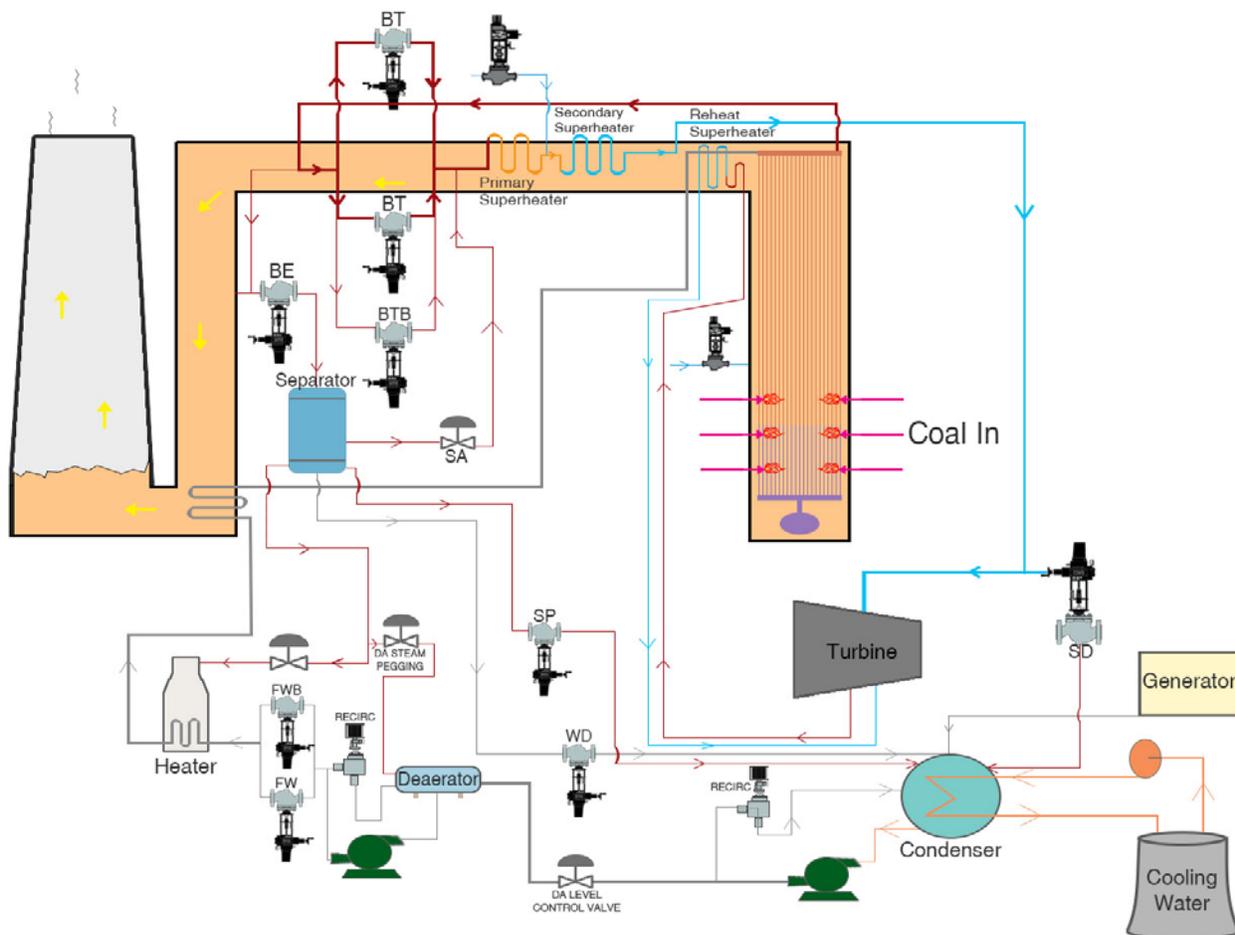
The result is slagging and fouling that ultimately leads to increased thermal fatigue of boiler tubes, and subsequent leaks. Load rejection scenarios and turbine upset conditions have the potential to wreak havoc on the stability of furnace draft pressure. Air supplied to the boiler is separated into primary and secondary streams. The primary air is critical in heating the coal to the right temperature based on plant load. Dampers, able to track changes, prevent the coal from becoming too wet, and eliminate the risk of a pulverizer fire. Secondary air fed through the airbox and controlled by dampers are critical for complete combustion. Whether it is for a wall fired or tangentially fired boiler with low NO<sub>x</sub> burners, these air dampers are the final control element, and the determining factor for the highest efficiency.



# Supercritical Startup System

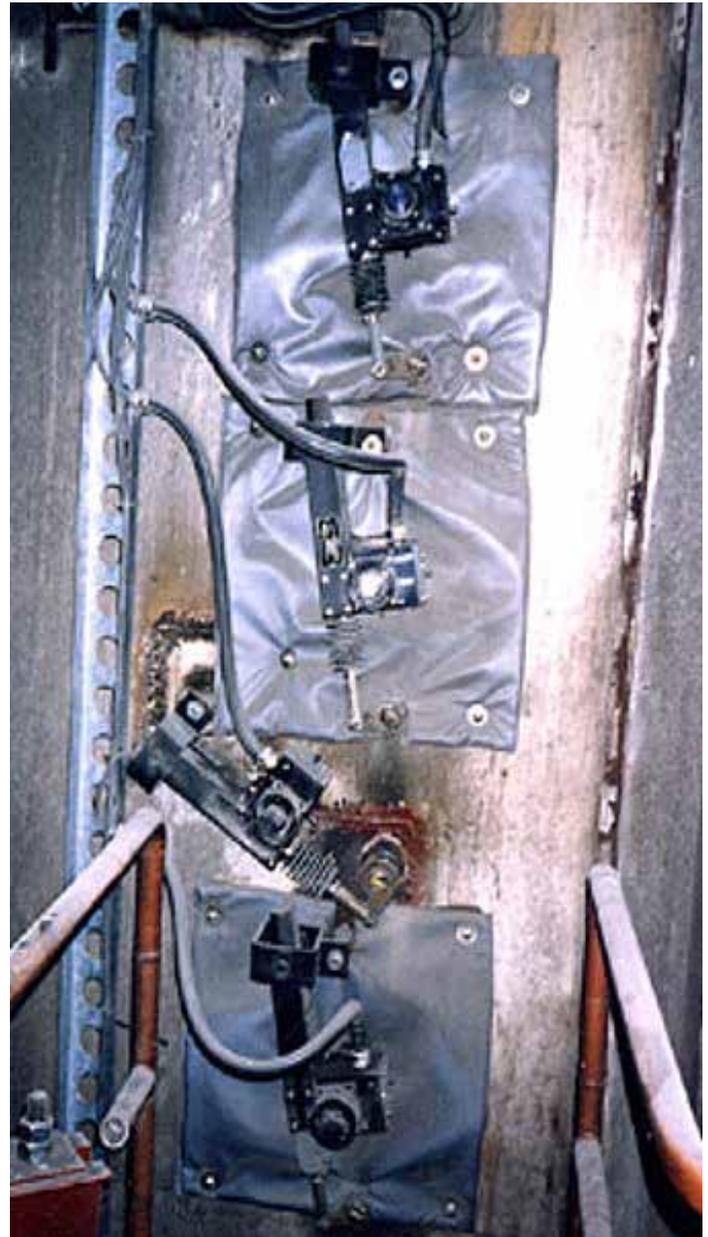
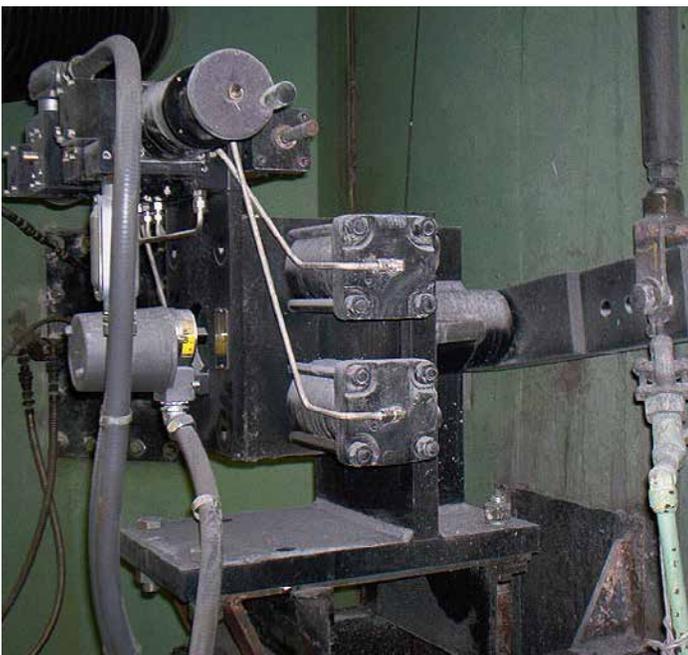
Supercritical and Ultra-Supercritical plants are best suited to remain a vital part of global power generation for decades to come. They operate above the critical pressure and temperature of water (3206.2 psia at 705.4° F), up to a maximum of 4350 psia and 1170° F. Since feed water is turned into steam as it travels through the boiler tubes, the operation of the startup system becomes extremely important. The startup system in Once-Through Critical Pressure Units from various manufacturers all serve the same purpose, and that is to roll and synchronize the turbine. An orderly startup sequence and initial unit load is made easier and faster with predictable actuation. During heat build-up in the boiler, both the water and steam in the flash tank/separator are directed to the deaerator through the pegging valve and feedwater heaters.

Once the enthalpy level in the flash tank reaches a desired level, steam is admitted to the superheater and main steam lines for warming. In reference to a CE process (see diagram below), it is then bypassed to the condenser through the steam drain/turbine bypass (SD) valves, which better match the steam temperature to the turbine metal temperature prior to rolling. It is through these valves that steam flow is admitted to the superheater through the Throttle Bypass (BTB) valves, and the flash tank/separator is taken out of service. It is critical that these Bypass Valves are accurately controlled, so the outlet steam temperature can be maintained to straight through operation, and opening of the Throttle (BT) valves. The DCS uses the bypass system during startup and low load operation for feedwater pressure and flow control.



# Burner Tilts and Windbox Dampers

*“My Air Register Dampers were a problem for me once the boilers went online. The high ambient temperature was causing my rotary electric actuators to fail every few months. I had to keep a number of them in stock to support the plant between outages. Now that the REXA Actuators are installed with the electronics away from the side of the boiler, I haven’t even thought about those drives in over a year...”*



- Decrease ramp times
- Improve stoichiometric ratio
- Stiff hydraulic control with no overshoot
- High frequency response on overshoot
- Track control signals for accurate burner positioning
- High temperature rating allows for increased life span
- No oil maintenance required
- Remote electronic controls are stored away from heat



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