

Active Leakage Control



Effective Radial Sealing System for Rotating Regenerative Heat Exchangers

The rotating regenerative heat exchanger for application as Air Preheater in utility boilers or as Gas-Gas Heater in environmental plants is characterized by its ability to transfer large amounts of heat in an efficient and space/cost saving manner. However, by its functional nature it creates leakage between the gas flows which is not beneficial for the overall plant efficiency.

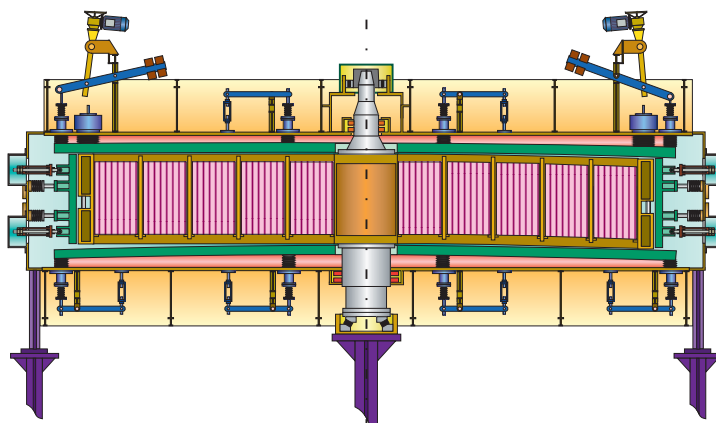
In order to minimize this leakage, BWE has developed a highly efficient sealing system for the radial sector seal plates.

The Radial Sealing System

The primary sealing system in a regenerative heater is the radial sealing system which prevents the direct leakage from the gas side at highest pressure to the gas side at lowest gas pressure.

The radial sealing system comprises sector plates placed diagonally on the top side and underside of the sector beams creating labyrinth seals between the two gas sides together with the radial walls of the rotor.

As shown in the cross sectional view of an Air Pre-



Gas-Gas Heater cross sectional view

heater below, the shape of the rotor changes from cold to hot condition due to the temperature difference between the hot upper part of the rotor and the cold bottom part. In order to retain a fixed minimum gap between the sector seal plate and the rotor, the sector seal plates must be adjusted according to the actual shape of the rotor. The purpose of BWE's sensor controlled sealing system is to perform this adjustment automatically and continuously.

If the plant is generally operated at a fixed load, the design of the system can be simplified by having manually adjustable sector seal plates at

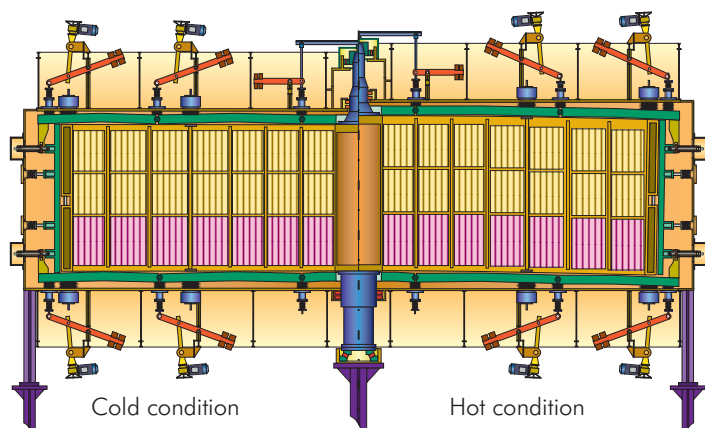
the cold end and sensor controlled plates at the hot end. However, if the plant is frequently operated at part loads it is beneficial to install the sensor controlled system also at the cold end.

Measuring Sensor

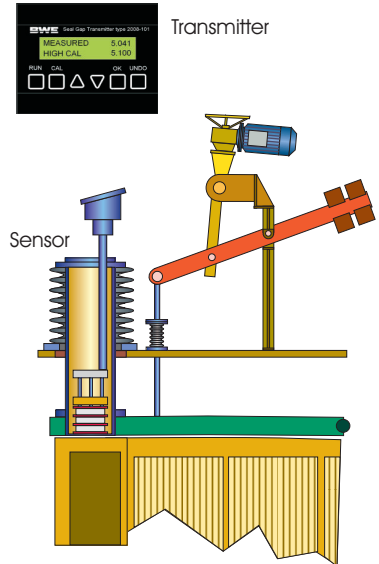
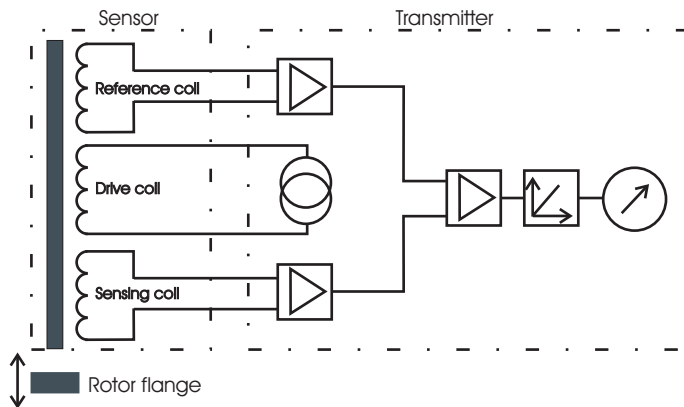
A measuring sensor device which continuously measures the distance between the sector plate and the rotor flange is mounted on each outer end of the radial sector seal plates, and in the case of large Air Preheaters also on the mid-section seal plates.

Measuring Principle

The position sensor uses three magnetic inductive coils installed in a sensor unit. The sensing coil is an open core coil which produces a magnetic flux according to the distance between the coil and the rotor flange. The reference coil is a closed core coil for temperature compensation. The drive coil generates the magnetic field. The coils are made of aluminium wire insulated by aluminium oxide and are able to work continuously at temperatures up to 420 °C.



Air Preheater cross sectional view



Being insensitive to fly ash, water, gypsum etc, a major advantage of the inductive position principle is the ability to operate in dirty environments.

Control Panel

The signal from the sensor is amplified and linearized in a transmitter placed inside the local control panel. The actual distance, as well as the status of the system, is shown on the screen of the panel. Distance signal and alarms can also be shown on the DCS of the plant. The control panel also includes a PLC which compares the gap information to a set value and if necessary an actuator will move the sealing plate in order to maintain the correct gap distance.

Retrofit

In most cases an Active Leakage Control System can be installed rather easily on existing Air Preheaters and Gas-Gas Heaters

instead of a fixed sealing system or a manually adjustable system. This will bring the leakage to an absolute minimum, and hence save power consumption for the fans and increase the overall plant efficiency.

Summary

Active Leakage Control is an important feature for rotating regenerative heat exchangers. BWE's inductive system has proved to be particularly suited for this application.

The system:

- is insensitive to gas properties and fly ash content
- can operate in temperatures of up to 420 °C
- requires very little maintenance being a non contact system
- has proved to have a very high reliability
- has been in continuous development since 1978

World leader in steam power technology

Burmeister & Wain Energy A/S has specialized in the development and design of advanced steam boiler plants for utility and biomass fired power stations.

Furthermore, BWE designs a wide range of auxiliary power station equipment such as the BWE Low-NOx coal/oil/N-gas/biomass burners, Air Preheaters and Gas-Gas Heaters.

BWE is part of the Italian STF S.p.A. Group.

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