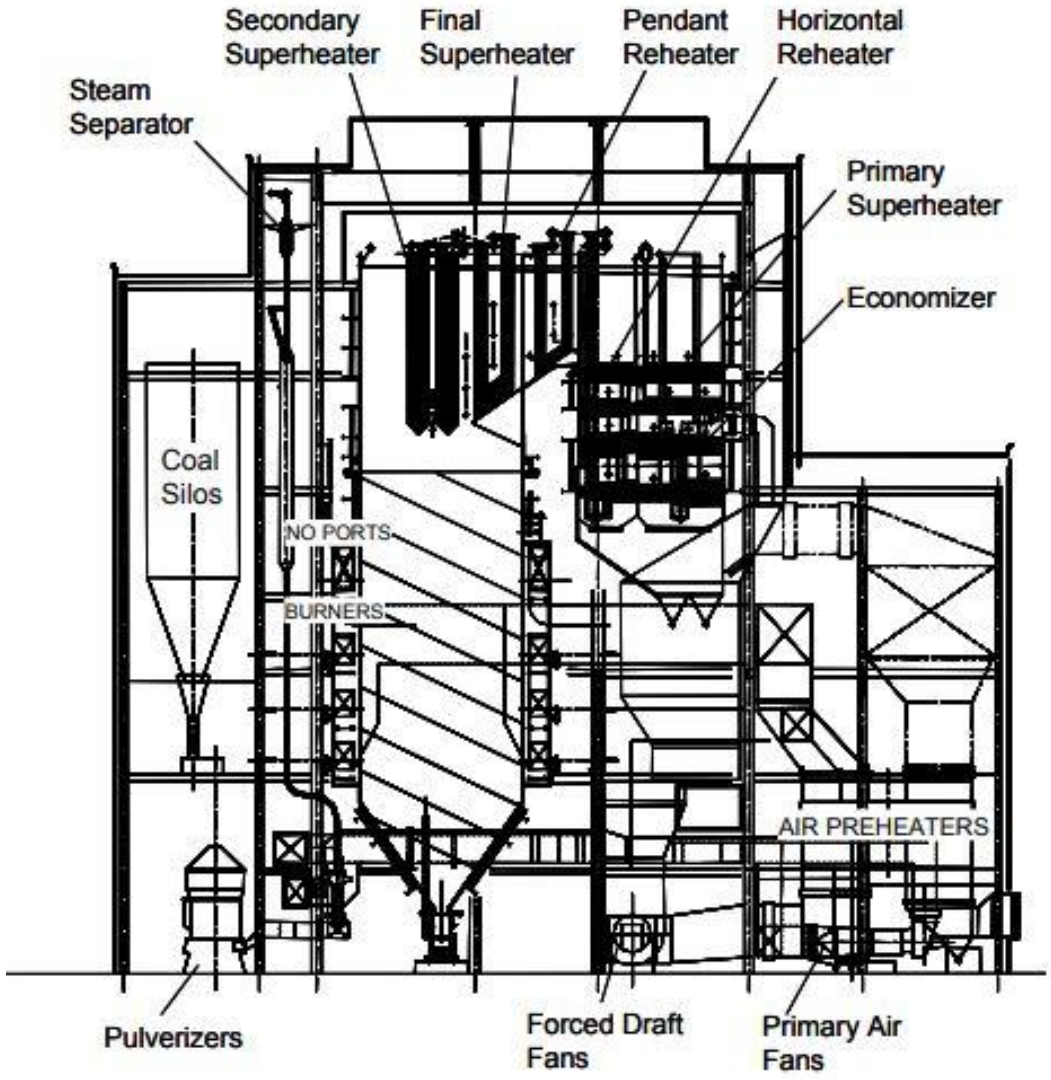

Secondary Superheater
Final Superheater
Pendant Reheater
Horizontal Reheater
Steam Separator
Primary Superheater
Economizer
Coal Silos
NO PORTS
BURNERS
AIR PREHEATERS
Pulverizers
Forced Draft Fans
Primary Air Fans

FACULTY OF ENGINEERING & TECHNOLOGY

Sliding pressure operation

Sliding pressure operation with a low-load recirculation system enables the Benson type boiler to start-up with similar operation characteristics and a start-up pressure profile as for an NC drum type boiler.

While the start-up valves in a constant pressure supercritical boiler have to resist a large pressure difference during the bypass operation, the start-up valves in a sliding pressure boiler are only used during the swelling period, which occurs immediately after boiler light-off.

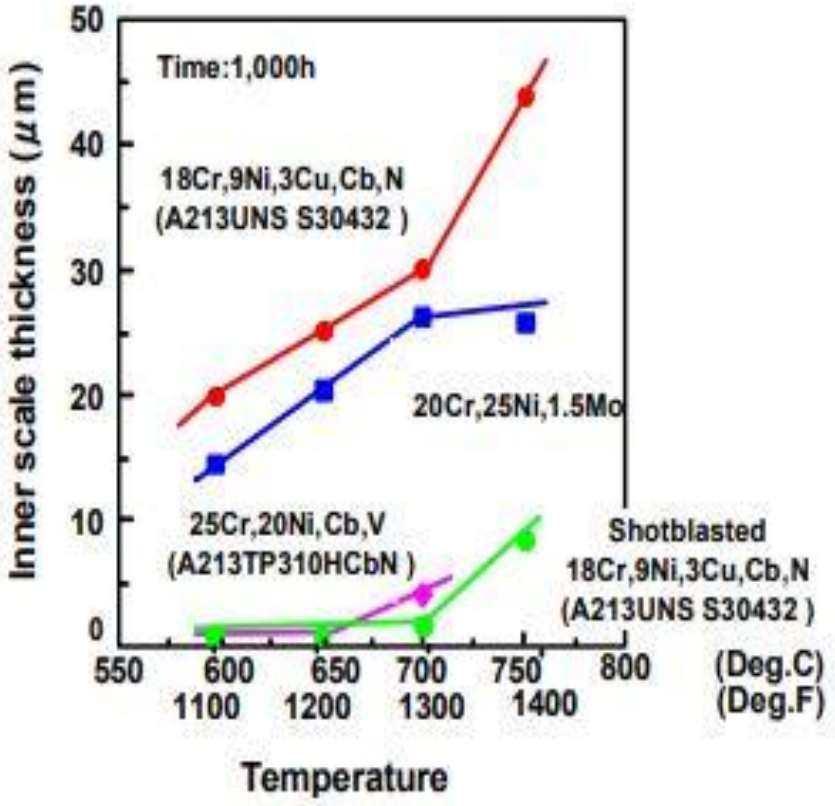
The differential pressure during such swelling is less than 100psi, and therefore the duty of the start-up valves is much less in a sliding pressure boiler than the constant pressure boiler.

Steam oxidation

The formation of steam oxide scale in stainless steel tubing is an important issue to be taken into account in the design for high steam temperatures.

The steam oxide scale formation rate increases with operating temperature, and as a result the potential for exfoliation of oxide scales can become very high.

This countermeasure can be performed up to certain steam temperatures, as shown in Figure 9. By appropriate internal shot blasting, the formation of steam oxide scale on the inside surface of shot-blasted tubes is negligible in the operating range of supercritical boilers. This technique can be applied for tubes for service well above 1100ºF



Sulfidation

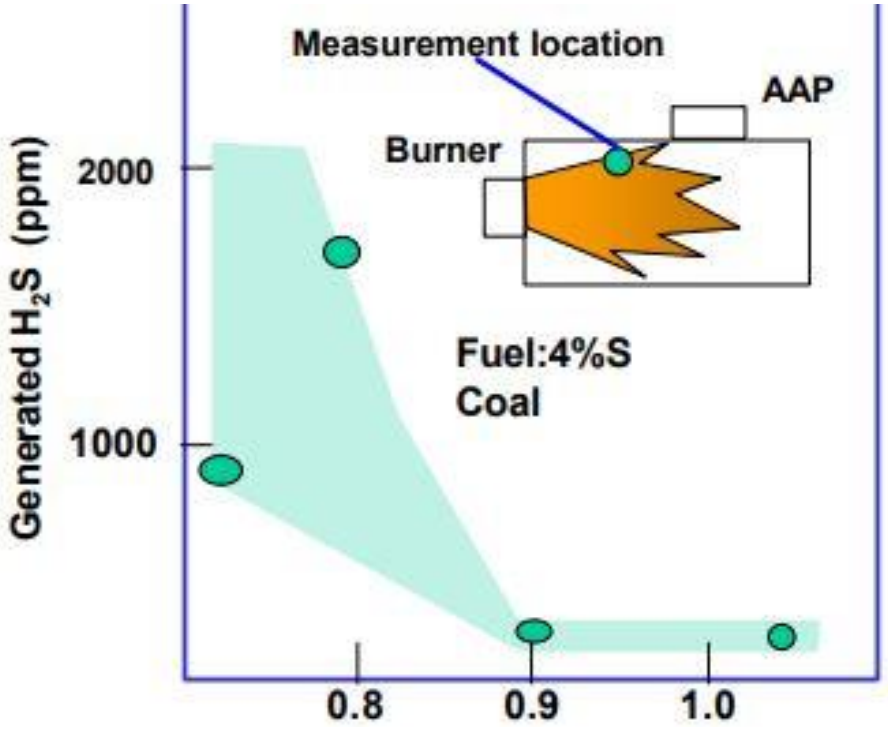
Sulfidation is a process where hydrogen sulfide (H2S) created in the combustion process reacts with waterwall tubes and leads to severe wastage.

The key parameters that determine the level of sulfidation are sulfur content in fuel, burner stoichiometry (the atmosphere around the burners), tube material compositions and metal temperature.

While a lower stoichiometric ratio in the combustion zone is favorable to lower the amount of NOx produced, adversely it can result in higher levels of H2S production,
and hence will promote sulfidation.

Fig. shows the relationship between the burner stoichiometry and the concentration of H2S produced near the burner while firing high sulfur coal.

Although the level of generated H2S depends on the sulfur content, the results show that a higher stoichiometric ratio can suppress the generation of H2S during combustion. The setting of appropriate burner stoichiometry is a significant factor in reducing the potential for sulfidation.


Measurement location
AAP
Burner
Fuel:4%S
Coal
Generated H_2S (ppm)
2000
1000
0.8
0.9
1.0