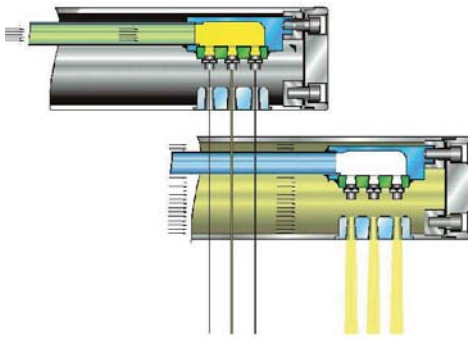


Fans and Heat Exchangers

AIR PREHEATERS ARE ENHANCED AT ENSTED POWER STATION IN DENMARK TO ALLOW THEM TO ACCEPT THE CONDITIONS IMPOSED BY A NEW SCR PLANT.



The sootblower plays a vital part in keeping pressure drop within specified limits.

In 1996 Howden modified air preheaters at Ensted Power Station in Denmark, to accept new gas conditions imposed by the retrofit of an SCR plant. New elements, cleaning lances and sealing systems have resulted in the plant operating successfully whilst exceeding availability targets.

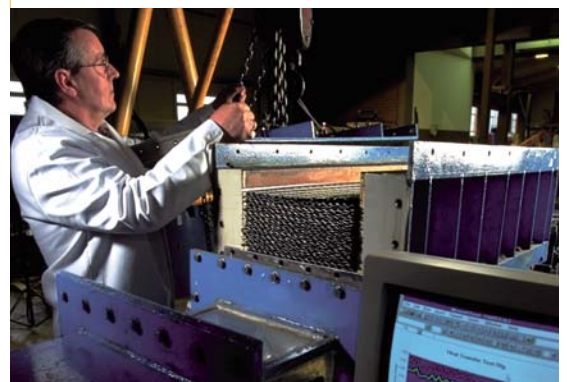
Unit EV3 at Ensted power station in Denmark consists of a 660MW PF fired boiler burning a range of imported coals (including some from the US) that vary in sulphur content from 1.4 to 2.6%. Among measures to comply with new environmental regulations, the owners Sønderjyllands Højspændingsværk retrofitted a selective catalytic reduction (SCR) plant to reduce nitrogenous (NO_x) emissions. This was fitted upstream of the air preheater, which therefore had to be modified to take into account the new operating conditions.

Any unused ammonia from the SCR process will produce ammonium bisulphate, which can condense on the air preheater elements at metal temperatures between 150 and 220°C. In addition the catalyst has the potential to increase the amount of SO₃ in the flue gas, which in combination with fly ash can be a major cause of fouling at the cold end of air preheaters. After discussions with the owner, Howden Sirocco received a contract to upgrade the preheater on three fronts:

- To minimize the potential for fouling on the heat transfer surface
- To improve the cleaning system
- To reduce air to gas leakage

The element configuration was changed from three to two-tier. All metal temperatures below 200°C were kept in the cold end layer, in order to prevent inter-tier deposition of ammonium bisulphate. The cold end tier was enamelled to prolong element life when firing high sulphur fuels.

All element profiles supplied have been tested in Howden laboratories.



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Experience



Howden can choose from a range of more than 40 element profiles.

New sootblowers were fitted which combined steam blowing and water cleaning in a single fully retractable lance. This arrangement permitted on-line high-pressure water washing in addition to regular steam blowing and off-line low-pressure water washing.

The air preheater sealing system had deteriorated to such an extent that the station considered the air leakage, at 14%, to be too high. This was converted to the modern Howden VN system, which among other things involved upgrading the rotors by increasing the number of seals, and modifying the sector sealing plates. Reducing air heater leakage, which in turn reduces the fan flow, allows the FD & ID fans to generate more pressure which will compensate, fully or partly, for the extra draft losses associated with the SCR system.

Howden received the go-ahead early in 1996 for the turnkey refurbishment of the preheater, involving survey, design, manufacture, procurement of ancillary items, installation and commissioning. At the same time, Howden received orders to supply gas reheaters and

combined ID/booster fans for the new FGD plant at the station. The work took place during the summer outage that year and the plant was commissioned in September 1996.

After two years operation, independent tests have shown that the thermal performance has remained within specification, and leakage has been maintained at less than 6%. The cleaning lances have helped the air heater exceed availability targets while operating under conditions liable to cause severe cold end fouling.

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