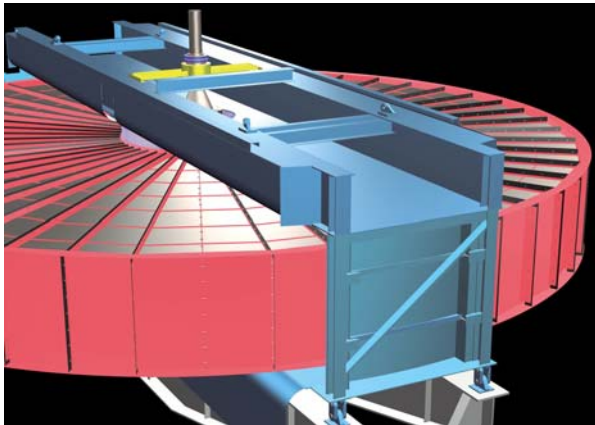


MODIFICATIONS TO THE AIR PREHEATERS AT INCE POWER STATION ARE AN INTEGRAL PART OF A CONVERSION TO ORIMULSION FIRING



Computer model of Howden VN air preheater
(ducting removed).

As part of the conversion of a boiler to fire Orimulsion, the station estimated that it could improve performance if the air preheater was modified to take account of the new operating conditions. Adoption of Howden VN technology contributed to the unit generating an extra 25MW.

Ince B consists of two 500MW oil fired units in North-west England, which were commissioned in 1976. In 1993 Unit 5 was converted to fire Orimulsion whose composition, in particular the high water content, would lead to an increase in the mass flow and temperature of flue gas leaving the boiler. It was estimated that after conversion, the nominal electrical output from the unit would not be achieved and it would only generate around 450MW.

Two contributory causes were the greater amount of energy being discharged from the stack, and the higher volume flow of gas to the induced draught fan. Following an inspection by Howden, it was determined that it would be possible to:

- a) increase the heat recovery in the air preheater by increasing the depth of elements and by using more efficient element profiles, and
- b) to reduce the leakage by upgrading the sealing system.

The original rotor contained adjustable radial seals that compensated for rotor thermal deformation during operation. By removing this feature, space was released which could be used to increase the overall element depth. In addition to taking advantage of this, the 2.78DU hot end elements were replaced with the higher efficiency FNC design. A reduction in gas exit temperature from 168 to 153°C was predicted, (which equates to an increase in boiler efficiency of 0.65%), and this was achieved on start-up.

Typical reduction in maintenance activities compared to actuated sealing variant.

Maintenance item	Actuated sealing	VN sealing
Rotor seals	100%	50%
Static seals	100%	10%
Drives etc	100%	80%
All maintenance	100%	60%

Fans and Heat Exchangers Experience



High efficiency VN element design provides maximum heat exchange per unit depth.

During the conversion programme, the Howden VN sealing system was installed in the air preheaters, which reduced leakage to 6.5% from the 12% that had prevailed previously. The lower temperature combined with the reduced air leakage allowed the induced draught fans to handle a greater mass flow of flue gas, which gave the station the ability to fire more fuel.

The modifications carried out by the station, which included those on the air preheater, permitted the unit to generate 475MW, 25MW more than originally calculated. After two years operation when the air heater performance was checked, it was found that the air leakage had remained constant. Four years operation showed that the element configuration was suitable for this fuel and that a combination of air-blowing and periodic washing could clean these adequately.

In 1997 Ince B reached the end of its programme of firing Orimulsion.

A peripheral benefit of using the VN sealing system is a reduction in maintenance requirements on the air preheater. For example, generally rotor seals do not have to be replaced every outage, and there are no seals behind the radial and axial sector plates.

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