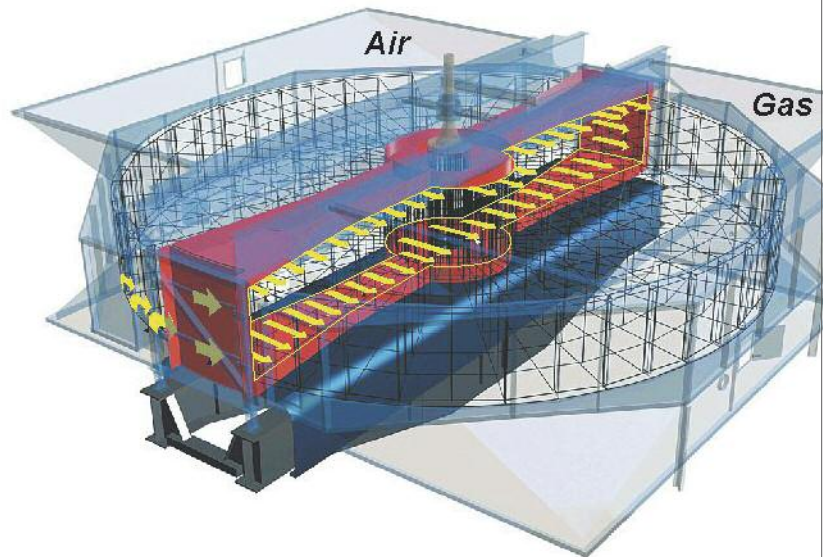


CASE STUDY:  
**SHAJIAO  
 POWER  
 STATION**  
 CHINA



Main leakage paths of air to gas.

**REPLACING THE AIR PREHEATERS RESULTED IN AN INCREASE IN UNIT OUTPUT OF 20MW**

INCREASING LEAKAGE IN THE AIR PREHEATERS RESULTED IN A SHORTFALL IN ELECTRICAL OUTPUT FROM THE STATION NEAR THE END OF EACH YEARLY CAMPAIGN. REPLACING THE STATIONARY MATRIX DESIGN WITH HOWDEN VN PREHEATERS HAS INCREASED THE OUTPUT OF THE STATION BY 2.8 MILLION KWH PER YEAR.

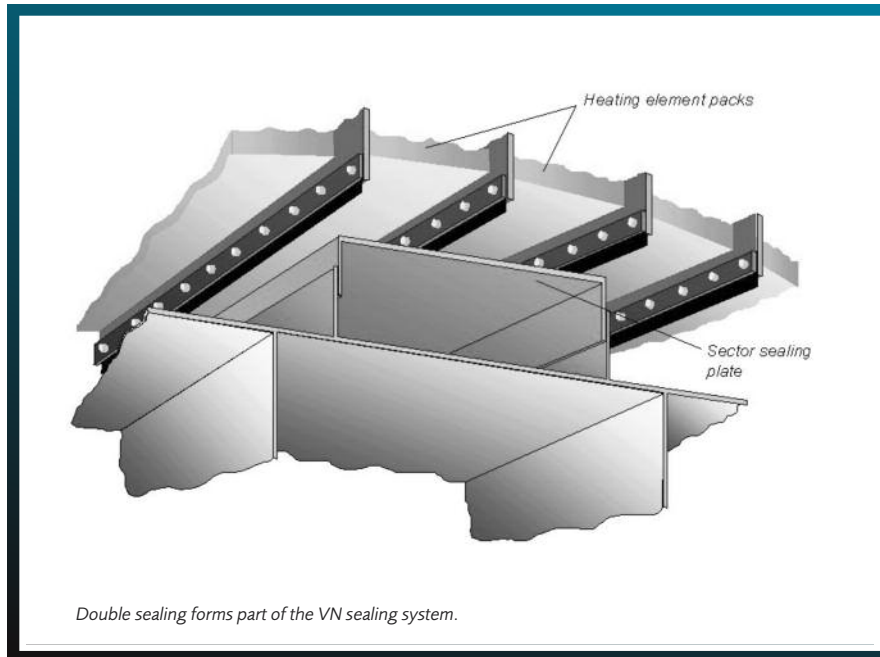
SHAJIAO A CONSISTS OF 3X200MW COAL FIRED BOILERS IN GUANGDONG PROVINCE IN SOUTHERN CHINA, WHICH WERE COMMISSIONED OVER THE PERIOD 1987 TO 1989. THE REGENERATIVE AIR PREHEATERS, WHICH WERE OF THE STATIONARY MATRIX TYPE, WERE PERMITTING AN EXCESSIVE AMOUNT OF AIR TO LEAK INTO THE FLUE GAS STREAM TOWARDS THE END OF EACH YEARLY OPERATING CYCLE. THIS RESULTED IN A SHORTFALL OF AROUND 20MW IN ELECTRICAL OUTPUT DURING THAT PERIOD, WHICH THE STATION ESTIMATED LOST AROUND 2.8 MILLION KWH EACH YEAR.

It was decided, after consultation with Howden engineers, that the best solution was to remove the heaters and replace them with the Howden VN design, which operates on the more common rotating matrix principle. A second objective of the project was to improve the heat recovery

and increase the temperature of the air entering the boiler. As the duct layout for the two types of air preheaters is significantly different, Howden accepted responsibility for the design of a revised layout, which in addition to matching the terminal points would result in a lower pressure drop. The air preheaters were manufactured in the Belfast factory of Howden Sirocco during 1996 and shipped to site along with the new ducting, which became part of the contract. Commissioning took place early in 1997.

Parameter	Before	After
Leakage	30%	6%
Auxiliary fan power	Datum	-259kW
Boiler efficiency	Datum	+1.0%
Fuel	Datum	-6220T/yr
Unburnt carbon	15%	8%
Unit output	180MW	200MW
Payback on investment	Less than 2 years	

## CASE STUDY: SHAJIAO POWER STATION, CHINA



Independent tests, in accordance with ASME Ptc 4.3 have confirmed that the leakage has been reduced to less than 6% and that it has stayed at this level for over 1 year of operation. At the same time, the air temperature to the boiler has increased by 20°C, which equates to an increase in boiler efficiency of around 1%.

The payback period is anticipated to be less than two years, and the successful completion of this project has led to the station carrying out the same modification on a second boiler, for which Howden has received a repeat air preheater order. Since the time of the first contract Howden has opened a facility in Shandong Province, which has the capability to manufacture air preheaters in China. The second set of air preheaters is being supplied from this plant.

Howden carried out a similar modification at Datong Power Station in Shanxi Province, where independent tests verified that leakage was reduced from 42% to 5%.

### EXPERIENCE

By the end of 1998, Howden had enhanced the performance of over 200 air preheaters in the following countries

Australia	Pakistan
China	Poland
Denmark	South Africa
Egypt	Spain
Hungary	Turkey
Israel	United Kingdom

**THE PAYBACK PERIOD IS ANTICIPATED TO BE LESS THAN TWO YEARS, AND THE SUCCESSFUL COMPLETION OF THIS PROJECT HAS LED TO THE STATION CARRYING OUT THE SAME MODIFICATION ON A SECOND BOILER.**

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