Successful Implementation – Energy Conservation Measure

Measure		
Improving the Specific steam consumption of Captive power plant		
Equipment		
Thermocompressor		
Industry / Sector		
Fertilizer		
Year of Implementation		
2005		
Cost Benefit Analysis		
❑ Type of Measure	:	Improving the efficiency of Captive power plant
❑ Annual energy Savings	:	Rs. 27.00 Lakhs per annum
❑ Actual cost savings	:	Rs. 40.00 Lakhs per annum
❑ Actual investment	:	Rs. 80.00 Lakhs
❑ Payback	:	2 years
Implementation Highlights		

Summary

The captive power plant is run by a Condensing type turbine. The Turbine exhaust was maintained at 0.25 ata by operating Air Cooled condensers. Slowly by other steam conserving measures, The CPP capacity was increased from 2.5 MW to 3 MW. The Air Cooled condensers were the bottleneck and the turbine exhaust shot to 0.5 ata, increasing the specific steam consumption from 6 kg/kW to 6.5 kg/kW.

In the same complex, we also have a Thermal desalination plant which requires steam at 0.3 ata. A team at 1.5 ata also was available in the plant.

The 1.5 ata steam was used as motive steam to suck the CPP, turbine exhaust and take it to thermal desalination plant through a Thermocompressor.

This reduced the backpressure of the turbine back to 0.25 ata and also fed steam to the thermal desalination plant to make more DM water. There was dual benefit of water generation and efficiency improvement of turbine.

Back ground

Thermocompressor was used to interlink a Captive power plant with Thermal desalination plant by properly utilizing the motive steam pressure. There was no electric drive in the system.

Principle

The motive steam at 1.5 ata and 9 TPH is used to suck 3 TPH of 0.3 ata to a pressure of 0.35 ata.

Thermocompressor is an energy device used to transfer steam from lower pressure to slightly higher pressure by utilizing the thermal energy of motive steam, which is higher than the discharge pressure. This works on the ejector principle.

Details of techno-economics:

Particulars	**Actual energy savings**
Contract Demand	**3500 KVA**
Annual Cost savings, Rs. lakh	**40**
Cost of implementation, Rs. lakh	**80**
Simple payback period, Year	**2**

Implementation issues	The lines connecting the Captive power plant exhaust and the thermal desalination plant are huge (1m dia) as the steam is 0.25-0.35 ata (below atmospheric pressure). Condensate collected in this line was difficult to remove as the line was under vacuum. This condensate created water hammering. This problem was solved by introducing vacuum traps in the line and the condensate was removed. The introduction of vacuum traps made the system stabilize easily.

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