

Successful Implementation – Energy Conservation Measure

Measure
Replacement of metallic blades with Fibre Reinforced Plastic (FRP) blades in cooling towers
Equipment
Cooling Towers
Industry / Sector
Pulp & Paper
Year of Implementation
1999
Cost Benefit Analysis
o Type of Measure: Low investment
o Annual Energy Savings: 1.97 lakh kWh
o Actual cost savings: Rs. 5.25 lakh
o Actual investment : Rs. 3.75 lakh
o Payback: 1 year 4 months
Implementation Highlights
<ul style="list-style-type: none"> ☞ Low cost measure ☞ This measure can be duplicated in cooling towers fitted with metallic blades ☞ Proven technology ☞ Many manufacturers in the market for FRP blades

Summary

Replacement of aluminium blades with light-weight FRP blades reduces the load on cooling tower fan motors & brings down energy consumption

Background

A well-known paper manufacturing company had one centralised cooling tower consisting of 3 cells. The cells are fitted with fans having aluminium blades. The cooling tower caters to Power Plant, compressors, evaporator and other sections of the plant. The 3 cells of the cooling tower operate continuously.

The fans are fitted with 55 kW motors. During an audit, it was found that the blades of the fans are of aluminium. Metallic blades are heavy & consume more power. All types of industries have adopted the use light-weight FRP blades in CT fans.

The plant also accepted this practice and changed over to FRP blades. This brought down the energy consumption by nearly 20% in fan motors.

Principle

The power consumed by fan motors is also dependant on the weight of the fans. FRP blades are much lighter in weight compared to aluminium blades and consume 20 to 40% less power.

Details of techno-economics:

Particulars	Actual energy savings
No. of fans	3
Total Power consumption	124.3 kW
<u>After replacement</u>	
Total Power consumption	98.7 kW
Annual Total energy savings, lakh kWh	1.97
Annual Cost savings, Rs. lakh	3.95
Cost of Implementation, Rs. lakh	5.25
Simple payback period, Year	1 year 4 months

Implementation issues

- ☰ The FRP blades were dynamically balanced by the plant maintenance team
- ☰ Certain environments attack FRP. Instead Glass reinforced Plastic (GRP) blades can be used, but they cost more & are not easily available.
- ☰ In the case of one fan, the motor was already underloaded. Replacement of the blades brought down the loading further. The motor was changed to a 45 kW motor from 55 kW.