

Successful Implementation – Energy Conservation Measure

Measure
Replacement of dessicant (adsorption) type dryer with refrigerated dryer in compressed air systems
Equipment
Compressed air
Industry / Sector
Pulp & Paper
Year of Implementation
1999
Cost Benefit Analysis
o Type of Measure: Medium investment
o Annual Energy Savings: 3.02 lakh kWh
o Actual cost savings: Rs. 7.04 lakh
o Actual investment : Rs. 10.00 lakh
o Payback: 1 year 5 months
Implementation Highlights
<ul style="list-style-type: none"> ☞ Useful for industries which need dry, compressed air ☞ Innovative technology

Summary

Adsorption type dryers consume more power than refrigerated air dryers and replacement of dryers results in considerable energy savings.

Background

A paper manufacturing plant has 5 reciprocating compressors. The compressed air is generated at 7.4-7.6 kg/cm²g. The compressed air in the plant is used primarily for instrumentation needs.

The compressed air is needed to be dry for this usage and a dessicant type dryer was in use at the plant. The disadvantage with the dessicant type dryer is that energy is needed to drive off the moisture adsorbed by the dessicant. Of course, a much lower dew point (dryer air) can be obtained by this type of dryer. In this case, the dryer was oversized to provide much drier air than needed and was consuming energy unnecessarily.

The dryer was replaced with a refrigerant type dryer which consumes much less energy as there is no dessicant to be dried.

Principle

Adsorption-type dryers use a desiccant which adsorbs water vapor in the air stream. Adsorb means that the moisture adheres to the desiccant, collecting in the thousands of small pores within each desiccant bead. The composition of the desiccant is not changed and the moisture can be driven off in a regeneration process by applying dry purge air, by the application of heat, or a combination of both.

In the refrigerant type dryer, the air stream is cooled to nearly 0°C. In the process, it loses moisture to maintain the dew point.

Comparison of the 2 types is as below-

Type	kW/1000m ³ /h	Dew Pt. °C	Purge
Heat less dessicant type	: 20.7 kW	-20	10-15%
Refrigerated	: 2.9	2-10	Nil

Details of techno-economics:

Particulars	Actual energy savings
Energy savings per hour by replacement of dryers in kWh	37.75
Operating annual hours	8000
Annual Total energy savings, lakh kWh	3.02
Annual Cost savings, Rs. lakh	7.04
Cost of implementation, Rs. lakh	10.00
Simple payback period, Year	1 year 5 months

**Implementa
tion issues**

☞ The dew point achievable with adsorption dryer is -23°C , while the refrigerant dryer provides higher dew point. This technicality was discussed with the instrumentation supplier for the plant before replacement.