

A Walkthrough Energy Audit of PRECOT MERIDIAN

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INDUSTRIAL POWER AND AUTOMATION

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Executive Summary

A walkthrough Energy Analysis was conducted in Precot Meridian to identify the electrical energy consumption pattern, electrical energy utilizing equipments used and to identify scope of energy saving opportunities, if any.

The walkthrough audit of the industry basically involved a visual inspection of various electrical equipments and installations, recording their ratings, duration of operation etc. and thus identifying existence of any possible energy saving opportunity.

Certain energy saving measures were identified with regard to lighting, proper thermal insulation of office room, replacement of fan regulators, optimal use of lights etc. These measures were informed to the plant personnel for necessary corrective action.

Introduction and Objective

A walkthrough energy analysis was conducted in Precot Meridian on 21 October 2015. An energy audit is a study of a plant or facility to determine how and where energy is used and to identify methods for energy savings. There is now a universal recognition of the fact that new technologies and much greater use of some that already exist provide the most hopeful prospects for the future. The opportunities lie in the greater efforts at energy efficiency and the use of these technologies and options. Therefore, an energy audit is a preliminary activity towards instituting energy efficiency programs in an establishment. It consists of activities that seek to identify conservation opportunities preliminary to the development of an energy savings program. Identifying where energy is used is useful because it identifies which areas the audit should focus on and raises awareness of energy use and cost. The results of the analysis can be used in the review of management structures and procedures for controlling energy use.

Important Points to Consider When Collecting Site Load Data

- a. Operating hours - This can be gathered from plant personnel. It is important to ensure the accuracy of this data because much of the potential for energy savings lies on correct estimation of the equipment's operating hours.
- b. Duty cycle - Machines such as large electric motors have varying loads and hence, different power requirements.
- c. Actual power consumed - For electric power users, this is based on either 3-phase current/voltage readings or power analyzer measurements. However, since this is a walkthrough energy audit, exact power consumption is not measured.

The objective of conducting this audit is to identify the electrical energy utilizing equipments, their ratings, period of use and energy saving potential that exist in this particular industry.

Methodology

The Energy analysis was carried out based on walkthrough type Energy audit, as well as giving special focus on identifying several areas that have the potential to implement energy savings measures. The following is a list of general procedure followed during the walkthrough energy audit during the industry site visit:

1. General information gathered regarding the industry.
2. Identify the electrical equipments utilized for various processes/activities and their ratings.
3. Approximate usage of each equipment per day.
4. Recommendation of energy conservation measures.

General information regarding the industry, its operation and product portfolio was enquired with the employees present in the industry at the time of this energy audit. This included the work pattern followed by the industry as well as other details such as number of employees and number of working hours, shifts etc.

The rating, operation pattern, operation duration of each electrical equipment was recorded and actual operation and condition of equipment was analyzed by simple visual inspection.

Wherever possible, the energy saving measures were identified, however keeping in mind that accurate measurements are not possible in a walkthrough audit.

Based on the observations, energy saving opportunities were analyzed and a simple savings calculation was carried out for justification.

General Information about the Industry

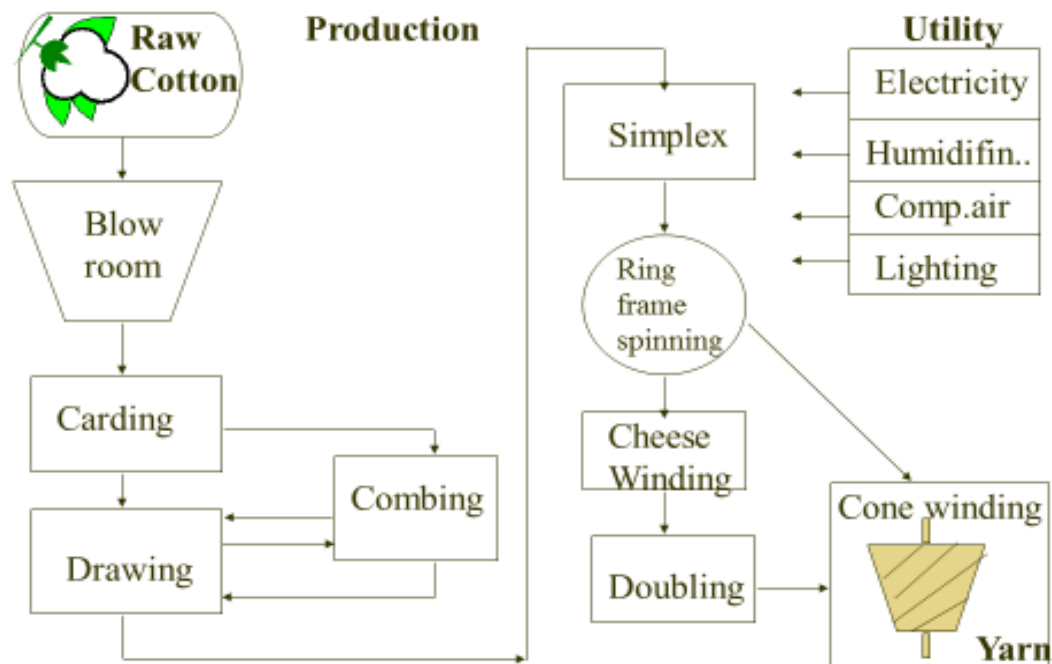
Precot Meridian Ltd (formerly Precot Mills) has been a prominent player in the textile industry since 1962. Precot offers an array of products in multiple segments and has earned national and international repute for the quality of its products. The company has been serving the Textile Industry for over five decades and has gained extensive expertise and knowledge across various product lines. Products manufactured fall broadly under two categories – Yarns & Threads and Health & Hygiene care. Precot Meridian started its first production in 1964 with an initial capacity of 12,096 spindles at Kanjikode, Kerala. Precot Meridian now has units in the four southern states of India viz., Tamil Nadu, Kerala, Andhra Pradesh and Karnataka with a total spinning capacity of 2,25,000 spindles and 1728 rotors.

Established by technocrats Mr.V.N.Ramachandran and Mr.N.Damotharan, Precot has slowly gained momentum in growth and diversity of products over the years. Precot`s range of over 20 product lines has gained wide acceptance amongst our clients across markets. Precot Meridian being an ISO 9001 certified company is focused on providing customer satisfaction across its product range. In order to meet customer requirements and to ensure their satisfaction, Precot Meridian implemented TQM in all the units for executing 5S methods of housekeeping and 3M methods to control wastage of resources. Quality Systems are achieved through total employee involvement, technical innovation and continual improvement.

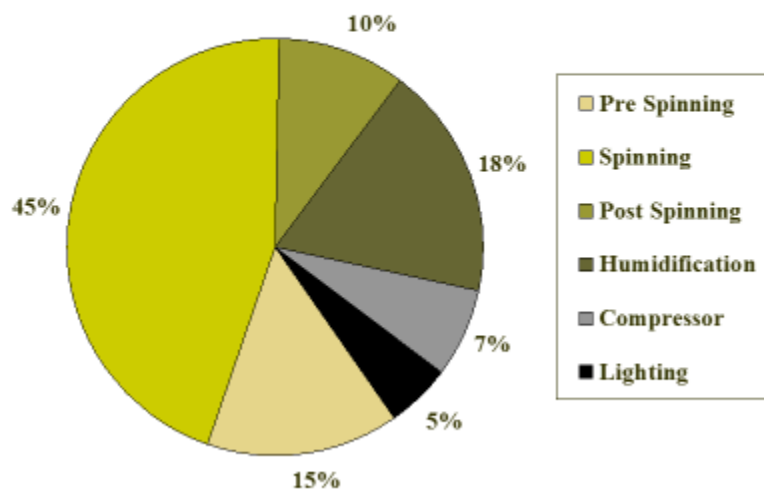
Since quality control is the mainstay of Precot Meridian`s success, there are various kinds of equipment introduced at several stages of the manufacturing process. These are some of the equipment used:

- High Volume instrument for cotton testing
- Advance fibre information system
- Uster evenness tester 4 for yarn testing and
- Tensomax for measuring single yarn strength.

Process Flow Diagram Spinning Mills



Power Consumption Pattern in Spinning Mills



Electrical Equipments in the Industry

The following electrical energy consuming equipments were found to be in use in the industry:

EQUIPMENT	RATING	NUMBER	USAGE IN HOUR
TRANSFORMER-1	66/22KV , 6 MVA	1	24
TRANSFORMER-2	22/440 V , 2 MVA	3	24
DG SET -1	440V,65 KVA, 15 A	2	2
DG SET-2	440V,1MVA,	1	1
SCIM	440V,40HP	20	14
BOILER	440V,85 KW,	1	10

	EQUIPMENT	ESTIMATION	POWER CONSUMPTION	RATIO
1.	LIGHTINGS	1926 UNITS X.08KW=154 KW	154 KW	5%
2.	AIR CONDITIONERS	64 UNITS X1.5 KW	96 KW	12%
3.	AIR COMPRESSORS	1 UNIT X 75 KW	75 KW	7%
4.	AIR COOLING SYSTEM	FAN 40 UNITS X .75 KW=30 KW PUMP 6 UNITS X2.2KW=13.2 KW	43 KW	6%
5.	SPINNING MACHINES	800 UNITS X .5 KW	.40 MW	45%
6.	OTHERS	40 KW (OFFICE, ELEVATOR, PUMPS etc.)	40 KW	5%
7.	BOILER	1 UNIT X 85 KW	85 KW	10%

Energy Conservation Measures

The following are some of the energy conservation measures that were identified during the walk through audit of this industry.

Lighting:

There were approximately 50 nos. of 100W incandescent lamps used. These can be replaced by CFL bulbs for energy saving.

Cost Analysis of Replacing incandescent lamps with CFLs (23W):

Total No. of incandescent bulbs = 50

Average Power saved per bulb = 77W

- Total Power saving = $50 \times 77W = 3850W$
- Average Use of bulbs per year = $320 \times 12h = 3840h$
- Total Energy saved per year = $3840 \times 0.385 \text{ kWh} = 15000 \text{ kWh}$
- Saving in Rs. Per year = $\text{Rs. } 15000 \times 5.5 = \text{Rs. } 82500$
- Average Cost of Replacing bulb = Rs. 250
- Total Cost of Replacing all bulbs = $50 \times 250 = \text{Rs. } 12500$
- Capital Cost Recovery time = $(12500)/(82500) = 0.2 \text{ yr}$

Hence, the capital cost recovery time for replacing all bulbs of the office is around 0.2yr.

Insulation of windows:

Since air conditioner is being used in the office building, proper insulation is required, however, windows were not properly closed and doors were kept open longer than usual. ACs were found

to be used without keeping curtains. These poor practices account for increase in AC load and thus consumption.

Summarized below are some guidelines for most efficient use of ACs:

- **Proper Insulation** – Good quality insulation must be maintained in the air conditioned rooms by keeping all doors and windows closed properly so as to prevent cool air go outland hot air come in.
- Instead of operating all motors at a time. Shifting is preferable there is a possibility of saving monthly ED (extra demand)-charges & ED-interests.

Fan regulators:

The industry continued to use an old office building which had old fan with conventional regulators.

It is therefore suggested to replace them with electronic regulators for better energy saving and longer life.

Cost Analysis of Replacing Resistance regulators with Electronic regulators:

Total No. of resistance regulated fans in office = 3

Average Power saved per fan = 8W

- Total Power saving = $3 \times 8W = 24W$
- Average Use of fans per year = $313 \times 9h = 2817h$
- Total Energy saved per year = $2817 \times 0.024 \text{ kWh} = 67\text{kWh}$
- Saving in Rs. Per year = $Rs. 67 \times 5.5 = Rs. 370$
- Average Cost of Replacing regulator per fan = Rs. 150
- Total Cost of Replacing all resistance regulated fans = $3 \times 150 = Rs. 450$
- Capital Cost Recovery time = $(450)/(370) = 1.2\text{yr}$

Hence, the capital cost recovery time for replacing all resistance regulated fans of the office is around 1.2 years.

Optimum usage of compound wall lights:

Few lights near the gate were found to be turned ON even during the day indicating negligence to turn them OFF in the morning. Plant employees must be made aware about the importance of electrical energy and advised to turn off unwanted lights etc.

Suggestions

After conducting a preliminary energy analysis in the industry I came up with following improvements which if implemented can reduce the energy usage considerably.

- Replace existing Sodium Vapor 250 W lamp with energy efficient 90W LED lamps in plant external lighting.
- Replace existing 20 year old motor with energy efficient class A motor.
- Replace the old compressor with new compressor
- Replace existing old window AC with a BEE star rated split AC's.
- Replace existing CRT monitors with LED screens.
- Run the DG set in fully loaded condition so that it operate at its optimum load point.
- Use of electronic chokes instead of conventional chokes
- Use of automated star-delta starter for under loaded machines.
- Implement solar power generation system for meeting the lighting loads.

Conclusion:

A walkthrough Energy Audit of Precot Meridian has been conducted and analysis were made based on the observations. The industry was technologically advanced and well maintained so no significant energy wastages was found. However, certain minor energy conservation measures were identified and the particular suggestions and their feasibility have been informed to the concerned person in the industry.