

JAYASHREE TEXTILES
(A unit of Indian Rayon & Industries Limited)
Rishra, Dist. Hooghly (West Bengal)

Unit Profile

Jayashree Textiles a part of Aditya Birla Group under the flagship of Indian Rayon and Industries Limited is situated at Rishra in the Hooghly District of West Bengal Established in Year 1949. Jayashree Textiles is one of the ISO 9000& ISO 14001 accredited Textile unit in Eastern India. It is a multi products company.

Manufacturing Facility and Product Range

- | | | |
|----|-----------------------|---|
| 1. | Flax Yarn Spinning | Linen Yarn and twines |
| 2. | Worsted Yarn Spinning | Pure Wool and blended yarns in Ecu and Dyed shades. |
| 3. | Wool Combing | Wool Tops. |
| 4. | Apparel and Fabrics | Synthetic, Linen and Flax Canvases. |
| 5. | Dyeing and Bleaching | Processing of fabric /Yarn for Spinning. |

Energy Conservation Commitment, Policy and Set up

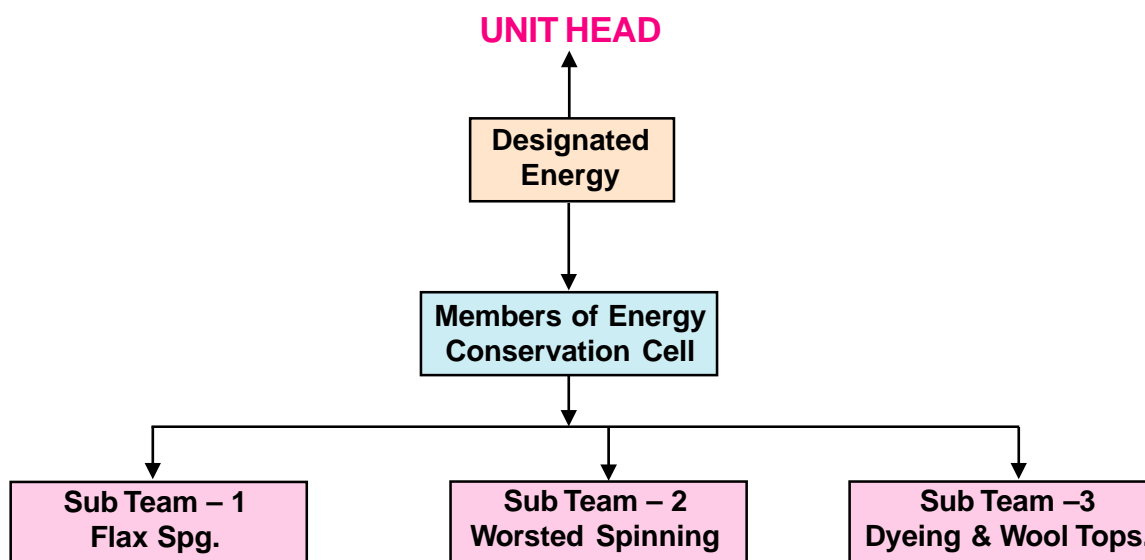
Jayashree Textiles considers Energy saving as a multi disciplinary approach. The Company's Energy profile consists of Electricity, coal , Furnace and water also. The importance of Energy Conservation is emphasized through various forums and methodology. A poster and slogan competition on Energy saving and in-house seminars is conducted .Energy conservation practices as a policy in J.S.T. since more than 10 years. The energy management policy declared by the unit is given below:

ENERGY MANAGEMENT POLICY

We are committed to continuously improve our energy performance in all our activities , products and services by way of

- a) Reducing specific energy consumption in our all activities.
- b) By use of energy efficient technologies /equipment.
- c) Involvement of all employees through small group activities.
- d) Maximize recovery of waste energy.
- e) Conducting regular management reviews to ensure continual improvement.

ENERGY MANAGEMENT TEAM STRUCTURE



Energy Conservation Achievements

In the year 2003-04, the unit has saved Rs 161 lakhs on account of various projects implemented, which is equivalent to 12.6% of the energy cost of the plant. Further the unit also saved 30 lakh kWh of electrical energy, which is equivalent to 9.85% of the electrical energy consumption of plant in 2003-04.

Major Projects implemented are as follows:

1. Project on Waste to Energy Conversion

OBJECTIVE : To generate power from biogas generated through anaerobic digestion of wool scouring effluent.

NATURE OF WOOL PROCESSING SLUDGE GENERATED AFTER EFFLUENT TREATMENT:

SLUDGE REPORT.

SL.NO.	PARAMETERS	RESULT (%)
1	ASH	36.75
2	VOLATILE MATTER	51.65
3	CARBON	35.76
4	NITROGEN	1.63
CHEMICAL OXYGEN DEMAND (COD) 55.11g/l DENSITY : 1.305 gm/cc NORMAL SLUDGE CONTAINS 80 % MOISTURE.		

RESULT OF PILOT PLANT TRIAL:

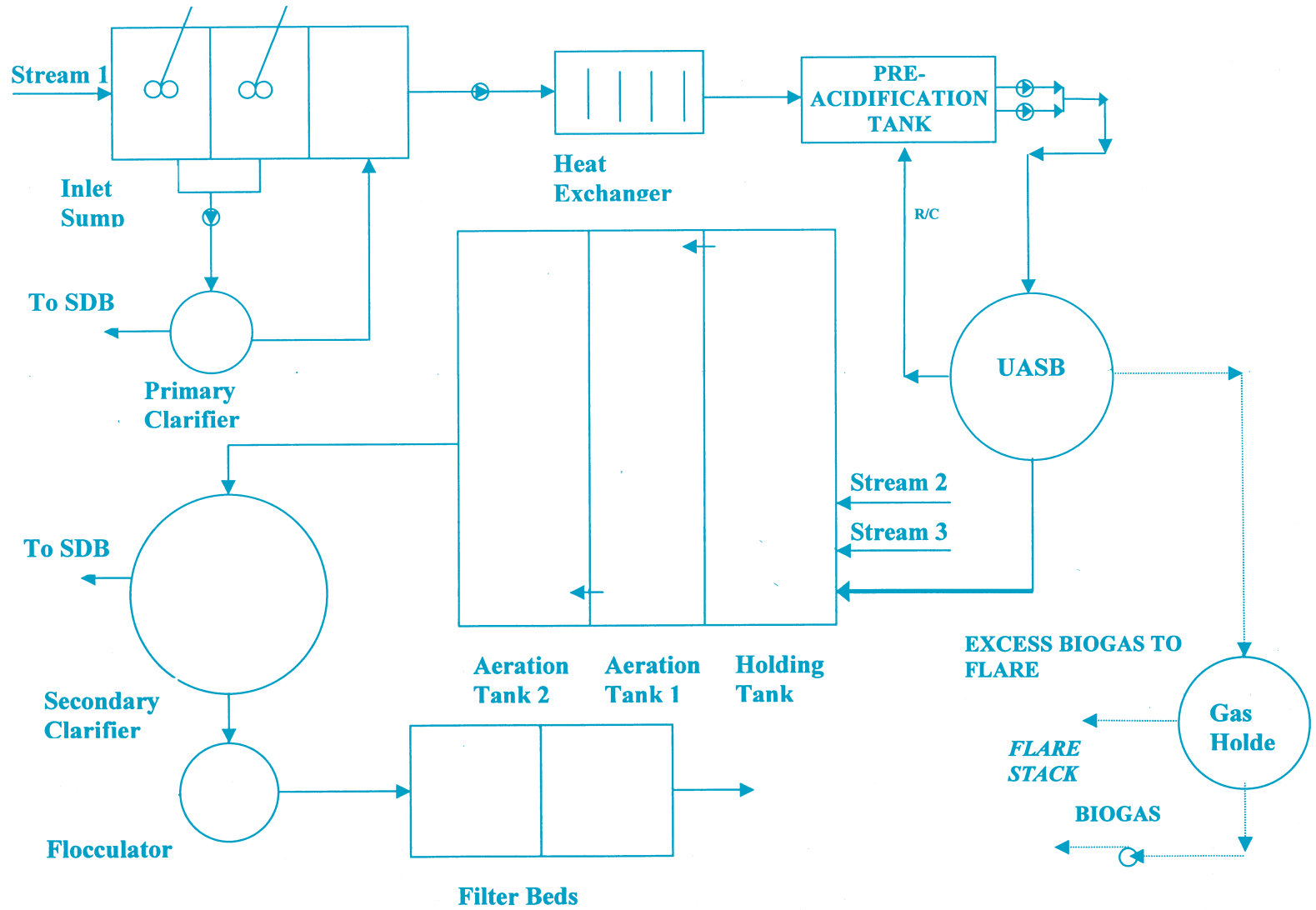
A pilot plant study was conducted in JST with 2 liter concentrated wool scouring effluent. Produced gas was analyzed in Bose Institute using Gas Chromatography (GC) Technology. Methane content in the produced biogas was found around 75-80 %. It takes 7 days to activate the process fully in ordinary anaerobic condition.

SELECTION OF TECHNOLOGY: After detail study of several options Up flow Anaerobic Sludge Blanket (UASB) Technology which is most suitable for the kind of effluent.

DESCRIPTION OF THE CURRENT SYSTEM :

1. The wool scouring effluent first goes to the settling tank, then to the UASB reactor through a primary clarifier. Most of the sludge is separated at this stage.
2. Biogas is generated through anaerobic bacteria within UASB Reactor. The biogas is utilized to generate power by a small dual fired generator to produce 65 kw power/hr.
3. After digestion the wool scouring effluent will come to holding tank with 20 % residual BOD & COD. Here Dye-house effluent will also come and will mix with it.
4. After that mixed effluent stream of wool combing effluent and the dye effluent stream are collected in Aeration Tank-1 & 2 where aerobic treatment is carried out.
5. After aerobic treatment the effluent will be transferred to Secondary Clarifier of 636 m³/hr capacity.
6. After that the mixed effluent is transferred to SPC-27, a 375 m³/hr capacity clariflocculator, where chemical flocculation takes place on requirement.
7. Finally the effluent is discharged to municipal drain after passing through sand filter bed.

PROCESS FLOW DIAGRAM FOR UPGRADATION OF EXISTING EFFLUENT TREATMENT PLANT INCLUDING INSTALLATION OF BIOGAS GENERATING EFFLUENT TREATMENT PLANT FOR M/s JAYASHREE TEXTILES , WEST BENGAL (INDIAN RAYON & INDUSTRIES LTD)



BENEFIT OF THE SCHEME:

- a. All standard pertaining to effluent quality has been surpassed in a consistent manner.
- b. 50 KW power is being generated from effluent through a dual fired (80 % bio- gas + 20 % Diesel) power generation system.
- c. Major pollutant in the effluent is being degraded biologically so chemical cost of treatment which was earlier in the tune of Rs.5.5 lacs/month reduced drastically to 1.5 lacs/ month
- d. In earlier system wool scouring sludge (which is 95 % of entire sludge generated) was mixing with Dye House sludge. As a result entire sludge was becoming hazardous. Handling of such a high quantity sludge as per Hazardous Waste Management Rule is extremely costly affair. It is also unnecessary, as wool scouring sludge is not hazardous in nature at all. In present treatment scheme wool scouring sludge is segregated before UASB reactor through a primary clarifier i.e. before mixing with Dye House sludge. So after complete implementation of the project volume of hazardous waste reduced to a great extent.

COST BENEFIT ANALYSYS:

There are four major benefits out of this project:

1. Maintaining pollution parameters 10 % less than original Pollution Control Board Norms
2. 650 M3/day inflammable bio gas having 80 % methane content. 1500 unit/day electrical energy can be generated from the generated gas which is around Rs.12 lacs P.A.
3. Presently entire effluent is being treated aerobically after chemical flocculation. Chemical cost at present is enormous which is around Rs.6.00 lacs /month on an average. This will come down to Rs. 2.5 lacs/month on an average, which means a saving of Rs. 42 lacs P.A.
4. Operating cost of UASB is negligible unlike aerobic system.
5. USING BENEFIT OF CLEAN DEVELOPMENT MECHANISM(CDM) : JST is under process to claim the benefit under Clean Development Mechanism (CDM). For this purpose it has engaged a multinational constancy firm for helping in fulfilling the documentation formalities required by UNFCCC. Project Initiation Note (PIN) & Project Design Document (PDD) are already finalized. This project along with two other projects implemented in the plant are awaiting for validation by an international validator firm accredited by UNFCCC. As abatement of one unit of methane is equivalent to 21 unit of CO₂ reduction, expected total ERU from the project will be 3300/yr. Expected CER from the project is around \$ 165000 (Rs.74 lacs) in next 10 years

2. Energy Conservation by reduction in running time of Air Compressor.

The compressed air system of Flax Spinning Mill, which produces Linen Yarn, Wool tops etc., comprises of three GA – 45 Model make of Atlas Copco (India) Ltd, one GA – 75W Atlas Copco and one Elgi – 1040 Model compressors.

This system is for the equipment to control the different functions of Textile machineries used in manufacturing the products like pneumatic valves, brakes, cylinders, cleaning of machines, pneumatic

splicing of the yarn etc. It is largely used in splicing system for joining the yarns after fault detected cut in Auto Winding machines (Savio & Muratec). So, the compressed air system is most important as like that of Power Supply for the Textile Industries.

This compressed air system consuming power nearly 5% of the total power consumed by the Plant (Worsted Spinning Mill). In terms of Units/Day it was 5521 Units/day by running two numbers of i.e., GA – 45 Model Compressors along with one small compressor with loading of 13 Hrs/Day.

EQUIPMENTS DETAIL :

Sl. No.	Equipment	Model	Air Capacity	Motor	Nos.
1.	Air Compressor	GA - 45	204 CFM	45 kW	03
2.	Air Compressor	GA - 75	400CFM	75KW	01
3.	Air Compressor	ELGI 1040	170 CFM	30kW	01
4.	Pump	-	-	7.5kW	03
5.	Cooling Tower	-	-	0.75kW	01

ACTION TAKEN :

1. Separate line and compressor is provided for high pressure requirement and low pressure requirement as below 6 kg/ cm² and below 8.5kg/ cm².
2. Provided V.F.D for auto winding Compressor Model GA – 45.
3. Stopped air – water supply for the conditioning purpose, and installed Humidifier.
4. Uses of Air Ventury blowgun for machine cleaning purpose where compressed air was directly used.
5. In all the machines, air pressure setting done as per requirement. Example as NSC Machines, and in Auto Winding Machine (6.2 kg/ cm²),etc.

RESULTS:

Sl. No.	BEFORE	AFTER
AIR	Required CFM = 204 X 3 + 400 X 1 + 70.8 CFM = 1082.8 CFM Air Compressor ELGI – 1040 loading only 10 Hrs. daily	CFM = 204 X 2 + 400 X 1 + 99.2 CFM = 907.2 CFM Air Compressor ELGI – 1040 loading Hours increased from 10 Hrs. to 14 Hrs. daily
POWER	Average per day Unit Consumption was 5521.	Average per day unit Consumption is 4409. Difference is 1112 units/day.

DATA COLLECTION :
DIRECT BENEFIT :

- Saving in Unit = 1112Units/day
- Saving in Rs. 1112 Units X362 Days X Rs. 3.70/ Unit = Rs. 14.81 lakhs/Year.

COST INVOLVEMENT :

- Pipes arrangement = Rs. .50 lakhs
- Labour Cost = Rs. 0.10. lakhs
- Air Ventury Gun = Rs. 0.04 lakhs
- Cost of Humidifier = Rs. 1.32 lakhs
(Two Double set + One Single set)
Cost of V.F.D = Rs. 2.54 lakhs
- Total cost = Rs. 2.54 + Rs. .50 + Rs. 0.10 + Rs. 1.32+ Rs.0.04
= Rs. 4.50 lakhs

SUMMARY:

Annual Energy Saving : **1112 Units/Day**
 Annual cost saving : Rs. 14.81 lakhs
 Actual cost : Rs. 04.50 lakhs
 Payback Period : 04 month

3. PROJECT ON IMPLEMENTATION OF DUAL HEATING SYSTEM IN STENTER M/C OF FABRIC D/H REPLACING THERMIC FLUID HEATER
BACKGROUND :

There is one Stenter machine in Fabric Dye House Dept of Jaya Shree Textiles(JST) which is used for drying and heat-setting process of Dyed fabrics. It has five separate chambers. The operating temperature

of this m/c varies from 160°C to 200 °C. The required heat of maintaining high temperature was supplied by a thermic fluid heating system.

Thermic fluid was heated at 220 °C and supplied to the radiator of Stenter M/C . Cold air supplied by blowers across the radiator absorbed the heat and temperature went above 200°C. This hot air then supplied to the Stenter chamber to raise the temperature .

Control of temperature within the chamber was done by controlling hot air flow to the chamber through dampers.

PROBLEM FACED :

Bench –mark study by fabric dye-house dept. showed that cost of processing in Stenter m/c was very high for linen blended fabrics. A project was undertaken by authors of this paper to study & solve this problem.

TO STOP THERMOPAC COMPLETELY THROUGH ALTERNATIVE HEATING ARRANGEMENTS TO MINIMISE WASTAGE OF ENERGY AND TO MINIMISE PROCESSING COST.

PLANNING : A dual heating system to be adopted . For linen fabric processing saturated steam of 9 kg/cm² to be used and for synthetic fabric processing supplementary heating source to be used to raise the temperature above 200°C

ADOPTED ALTERNATIVE HEATING PROCESS

After detail study of current system Electrical heating is being proposed for generating extra temperature during heat setting process of synthetic fabric. Following are the reason for selecting such system :

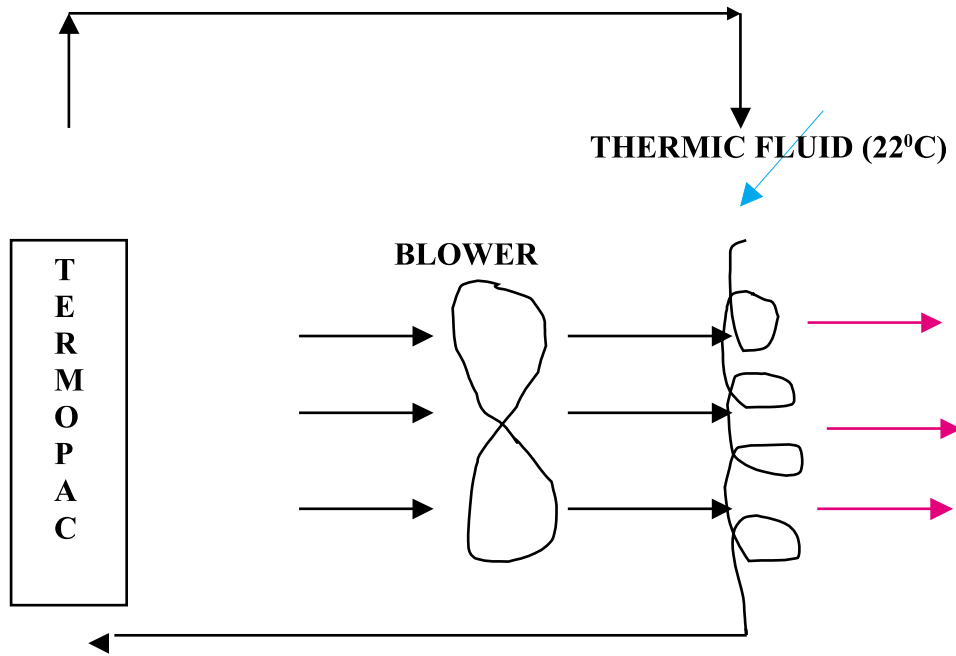
1. Technology is simple .
2. Technology has high reliability. No major R & D is required.
3. Technology is safe.
4. It is beyond doubt that electrical heating is costlier than thermal heating but in our specific process requirement ,it is cost effective as only 15% production requires extra temperature which means only 15% time of entire operation of SM Stenter electrical heating will be on whereas for Thermal heating Thermopac is to be on for entire period of SM production. Furthermore electrical heating will be used only to raise temp by 40 °C after steam heating.
5. Man power required for Thermopac may be reallocated as electrical heater may be operated by production people.
6. Electrical load on Thermopac is 40 kw which will be saved.

DEATAIL OF SUPPLIMENTARY ELECTRICAL HEATING :

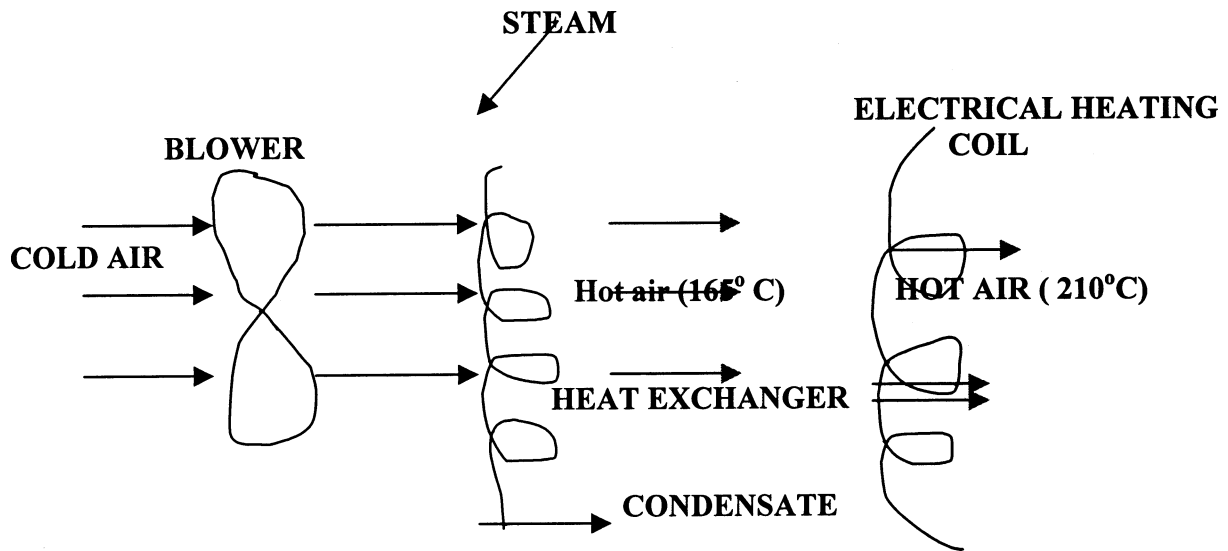
Comprised of 150 No of heaters having 3 kw capacity each. Each of last three chambers of five chamber

Stenter M/c possess 50 Nos. heaters. Electrical Heating System is switched on only when heat setting of synthetic material is going on which requires 200°C chamber temperature.

EARLIER SYSTEM :



PRESENT SYSTEM :



HEAT EXCHANGER
CONDENSATE

ENERGY SAVINGS :

1. OPERATING COST OF EARLIER THERMOPAC SYSTEM :

AVG. OIL CONSUMPTION : 438 KL/YEAR
 POWER CONSUMPTION : 225720 unit/year for Thermic Fluid Heater utility.
 = 20.83 KL OIL EQUIVALENT

TOTAL ANNUAL OIL EQUIVALENT CONSUMPTION : 438.02 KL

[Considering 1 lakh unit= 9.23 KL oil equivalent]

2. OPERATING COST OF CURRENT DUAL HEATING SYSTEM :

ANNUALISED STEAM CONSUMPTION : 3763.2 MT
OIL EQUIVALENT OF STEAM CONSUMPTION : 244976.9 KL /YEAR
 POWER CONSUMPTION : 17751 unit/yr
 OIL EQUIVALENT OF POWER CONSUMPTION : 1.7 KL OIL EQUIV.
TOTAL ANNUAL OIL EQUIVALENT CONSUMPTION AFTER PROJECT : 244.98 L/YEAR
NET FINANCIAL SAVINGS ACHIEVED : Rs. 53.24 LAKHS P.A.
INVESTMENT : Rs. 12.92 lakhs
SIMPLE PAY-BACK PERIOD : 3 MONTHS

ENERGY/FINANCIAL SAVING CALULATION :

1. OPERATING COST OF EARLIER THERMOPAC SYSTEM :

AVG. oil consumption : 438 KL/YEAR

ANNUAL COST OF OIL : 438 KL x Rs. 13700/KL (price of 7th March'03)
 = Rs. 60 lakhs P.A.

POWER CONSUMPTION : 225720 unit/year for Thermic Fluid Heater utility.
 = 20.83 KL OIL EQUIVALENT

POWER COST : Rs 225720 x Rs. 3.15/unit = Rs. 5.67 lakhs P.A. [Thermopac running hrs includes 10 % idle running during start-up & stop)

MANPOWER COST : (3 persons + 1 reliever) = Rs. 2.16 lakhs P.A.

MAINTAINANCE COST (including Thermic fluid): Rs. 2 lakhs P.A.

TOTAL OPERATING COST : Rs. 69.83 lakhs P.A.

But before implementation of the system careful analysis of temperature requirement, amount of production required, and high temperature for processing to be done properly. This technology will be cost effective only when high temperature application will be of very low percentage in comparison to total production.

INVESTMENT ON THE PROJECT :

• Heater & control pannel	:	Rs. 10 lakhs
• Cable & Misc.	:	Rs. 1.5 lakhs
• Steam Flow Meter	:	Rs. 1.3 lakhs
• Erection :	:	Rs. 0.12 lakhs
TOTAL INVESTMENT	:	Rs. 12.92 lakhs
SIMPLE PAY-BACK	:	<u>3 MONTHS</u>

Energy Conservation Plans and Targets

The following measures are planned to be implemented in the near future and have target to reduce specific energy Consumption by 3% compare to year 2003-2004.

1. Use variable frequency drive in H. Tower fans.
2. Modification in the Pneumafil duct of spinning machine – 27 Nos.
3. Replacement of old air Compressor.
4. Use of Cooling tower in – place of water cooled by Air Condition plant.
Use of effluent treated water.