RAYMOND LTD. (TEXTILE DIVISION)

THANE UNIT (MAHARASHTRA)

Company Profile :

'RAYMOND' a well-recognized and established brand in textile sectors. Raymond is a market leader in the worsted suiting fabric with the market share in excess of 50%.

The plant is located in Thane (Maharashtra) and manufacturing one of the finest qualities of worsted suiting fabric. In the year 2003 - 2004, 8.2 Million Meters fabric was produced and sale turnover was Rs.363 crores.

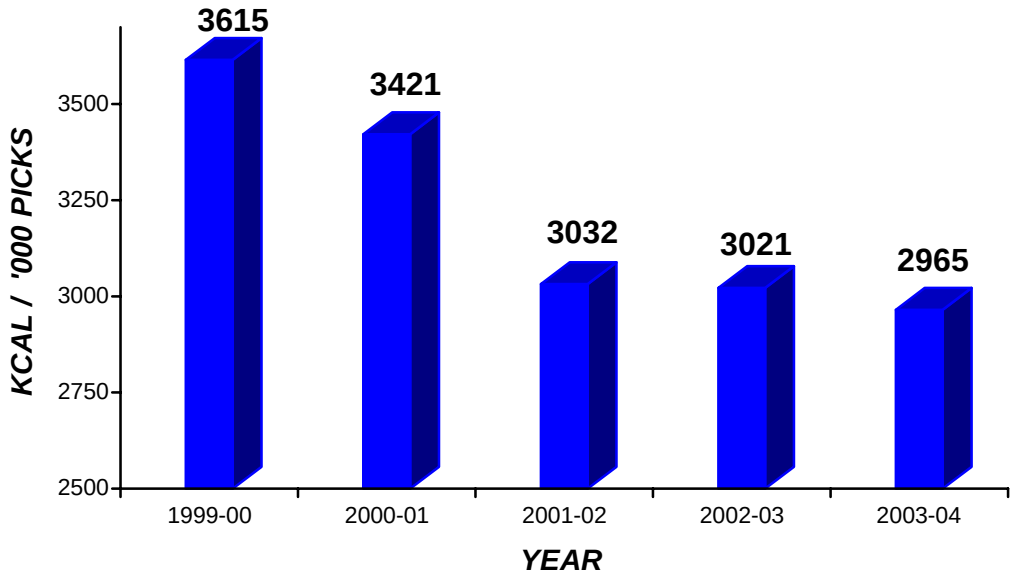
The Unit has adopted the most modern technology and has also given utmost importance for Energy Conservation. Unit has received First Prize on **National Energy Conservation Award for Year 2000, 2001,2002 and certificate of merit for Year 2003** given by **Ministry of Power**, **Govt. of India**.

Energy Consumption :

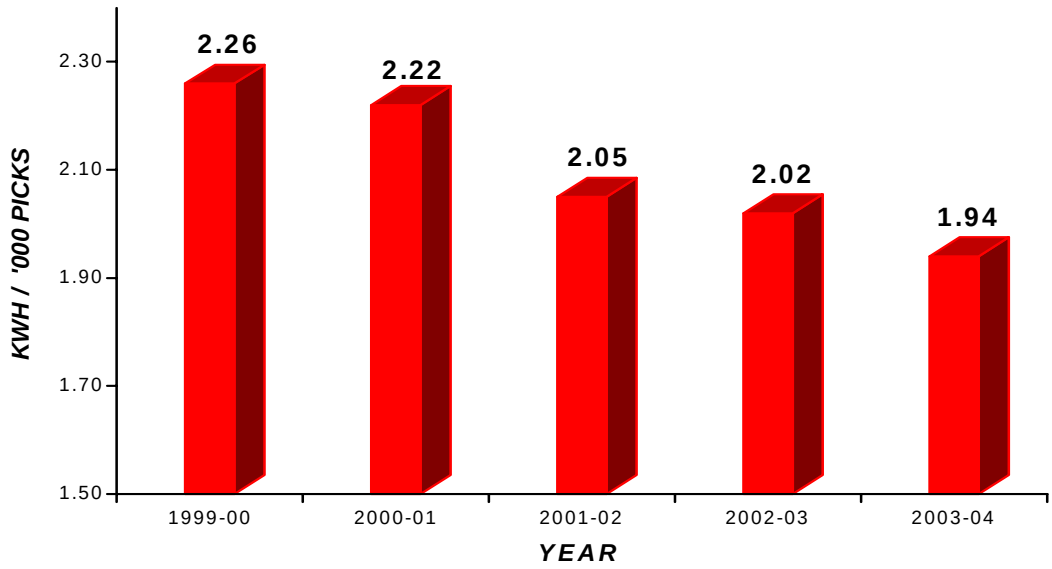
With the implementation of various Energy Conservation measures as an ongoing practice, there is steady decline of specific energy consumption and cost. Last three-year specific energy consumption figures are given below :

Description	Unit	2001 - 2002	2002 - 2003	2003-2004
Electrical Energy	Kwh/1000 picks	2.05	2.02	1.94
Thermal Energy	Kcal/1000 picks	3,031	3,021	2965
Total Production Cost	Rs. Lakh	16,766	16,926	18,386
Total Energy Cost	Rs. Lakh	2,002	1,844	1,975
Energy as % of Total Production Cost	%	11	10.8	10.7

SPECIFIC THERMAL ENERGY CONSUMPTION



SPECIFIC POWER CONSUMPTION



Energy Conservation, Commitment, Policy & Setup:

The Raymond believes energy conservation as a multi disciplinary approach. The unit has given utmost priority for reduction of energy consumption by putting continuos effort towards optimization of operating and process parameters, up-gradation of plant equipment and machinery.

To achieve energy conservation goal, a full fledge energy conservation cell is set up headed by General Manager (Engineering) and comprising the Technical personnel of Engineering Department.

The data on Energy consumption are prepared and reviewed at various levels of management.

* Daily Energy Consumption reviewed by General Manager (Engg.) and Technical Director.

* Monthly reviewed by President during working board meeting.

* Yearly reviewed for setting up energy consumption targets for next year.

The General Manager – Engineering , who is heading the energy conservation Cell is given free hand in working for close monitoring and controlling of energy consumption. The general Manager Engineering is also deciding the strategies to meet the energy conservation target. The other technical members of the cell are helping him in making techno-commercial feasibility study and in implementing accordingly in a scheduled time frame.

A top-level cost control committee is formed to strengthen the Energy Conservation activities.

The Committee members are Vice President (Textile Division), Technical Director, Works Directors of each unit, Head of Finance, Account & Costing Departments, key personnel from operation and Engineering Departments.

A monthly cost control meeting is conducted by Deputy Group President to review the measures taken to reduce the cost of the company, including Energy Conservation measures.

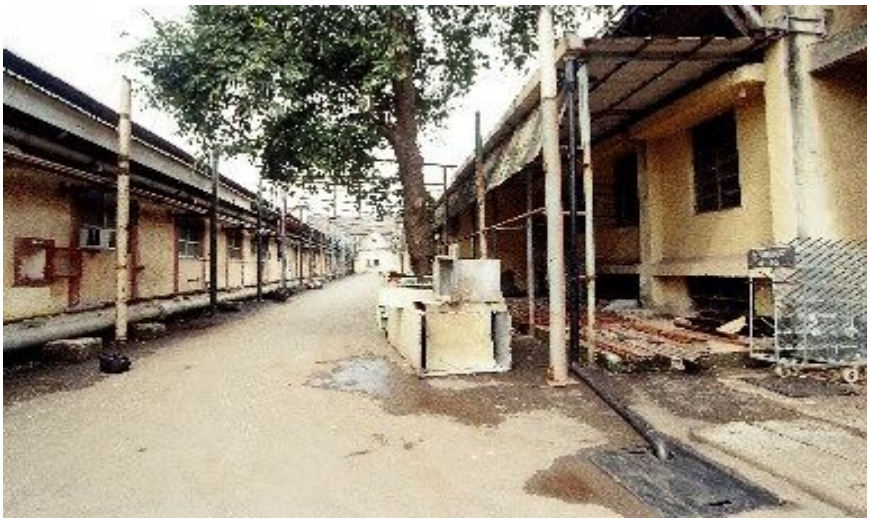
Thane Unit has introduced “Suggestion Scheme, Kaizen and Small Group Activities”, to create awareness towards cost control and Energy Conservation.

Small Group Activities :

In continuation of our effort after two days workshop jointly conducted by Bureau of Energy Efficiency, Government of India, Ministry of Power, under the Green Aid Plant (GAP) of Government of Japan.We have further strengthened our small group activity drive. In the original seven teams SGA, we have incorporated members from production departments like workmen, machine operators and supervisors. These teams meet once in a month to identify the energy conservation measures and the possible course of action to implement them.

Some of such energy conservation measures, which we have implemented during 2003-2004, are detailed below

Rain water harvesting of Reeling department Roof.



Cleaning of water reservoir tanks resulted in reduction of load on the water softening plant and subsequent saving in pump motor

* Rearrangements and removal of 80 tubelights in weaving department.
* Cooling water recovery of vacuum pump of 'CIMI' steaming machine
* Steam Trap checking and replacement.
* Removing compressed air leakage
* **Solar water heating for staff canteen dishwashing requirement.**

The above measures resulted in energy saving of Rs.4,54,000/-

Energy Audit is being conducted by outside agency to identify the energy saving potentials areas. The internal energy audit is also equipped with energy measuring equipment.

Energy Conservation Achievement:

Due to determined and sincere effort by plant personnel with high degree of involvement and motivation from top management, has resulted in steady decrease of specific energy consumption.

Specific Electrical and Thermal Energy Consumption of the plant in year 2002 – 03 was 2.02 kWh / 1,000 picks and 3,021 kcal / 1,000 picks, which is brought down to 1.94 kwh/1000picks and 2965 kcal/1000picks respectively in 2003-04. Thus reduction in specific electrical consumption by 3.9% and Thermal consumption 1.8%.

Major projects implemented during 2003-2004 are listed below.

1. **Lowering of false ceiling height in spinning department to reduce air conditioning load**

We have lowered the False Ceiling Height of Spinning Department. The height of false Ceiling was 16 Ft. in Spinning Department, but for normal working 12 Ft. height is sufficient. This lower height of false ceiling has resulted in reduction of around 62 TR of load on chiller plant of 350 TR.

The details of the savings are given below:

*	Load on 350 TR chiller plant with 16 Ft. height	-	210.0 kW
*	Load on 350 TR chiller plant with 12 Ft. height	-	172.8 kW
*	Reduction in load	-	37.2 kW
*	Annual Savings	-	Rs.11.09 Lakhs
	Investment	-	Rs.16.50 Lakhs

2. **Replacement of nozzle in spinning air washer.**

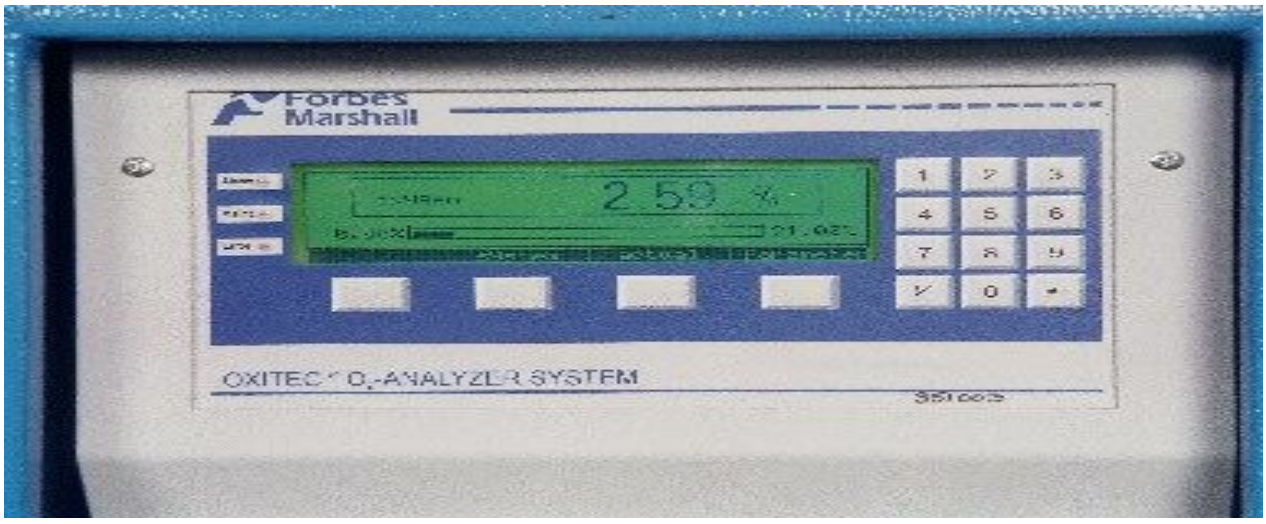
We have replaced existing Conventional Spray Nozzle by 25 Energy Efficient Atomizer in Spinning Air Washer

The energy saving due to less resistance to water flow is as follows :

*	Load on water pump motor with Conventional Nozzle	-	39.2 kW
*	Load of water pump motor with Energy Efficient Atomizer	-	32 kW
*	Power Saving	-	7.2 kW
*	Annual Saving	-	Rs.2,14,704/-
*	Investment	-	Rs.1,36,000/-

3. Installation of Effimax 4000 boiler combustion control system.

We have installed Effimax 4,000 Boiler Combustion Control System on 10 T/Hr. Boiler.
This system accepts the signal from oxygen analyzer control loop and maintains the oxygen level by controlling blower motor rpm. The blower motor rpm is controlled by VFD, which get signals from the Effimax system. Thus fine-tuning of the combustion is done. This will ensure consistent air to fuel ratio over the complete load range irrespective of changes in variable parameters.



The details of the savings are given below:

*	Power Saving of blower motor Due to less average load on motor	-	3.5 kWh
*	Fuel Saving due to better combustion efficiency	-	53.44 KL
*	Annual Saving	-	Rs.7,37,000/-
*	Investment	-	Rs.10,50,000/-

4.Replacement of old inefficient chiller plant by screw chiller plant for spinning air washer

(a) We have replaced Vapour Absorption Chiller unit by Screw Compressor Chiller unit

of 350 TR. The vapour absorption chiller is on steam based chiller unit. Due to increasing cost of Furnace Oil, the steam cost has increased upto Rs.1,000 per ton. Also due to aging of the unit, it has de-rated from its designed capacity of 450 TR. The new screw compressor chiller unit has more efficiency and hence consuming less energy per tonne of refrigerator.

The details of savings are given below:

* Net Fuel Saving as no Steam is used by Chiller unit after adjusting the equivalent electrical consumption of Screw Chiller - 153.20 KL

* Annual Saving - Rs.19,15,000/-

* Investment - Rs.65,00,000/-

(b) Since the flow requirement of Screw Chiller is less due to better cooling efficiency. The power saving is also achieved on condenser and chiller water pump motor.

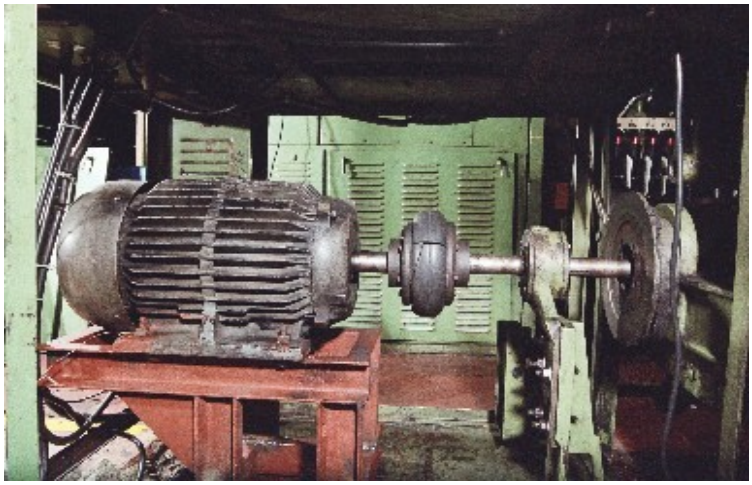
The details of savings are given below :

* Power Saving due to reduction of load on pump motor - 12.91 kWh

Annual Saving - Rs.3,85,000/-

5. Installation of VFD with direct coupling on Textool Ring frame machines

After successful trial on textool ring frame for direct coupling and inverter, we have implemented the same on balance 35 machines.



The details of savings achieved are given below:

*	Power Consumption of machine with 'V' Belt drive	-	5.58 kW
*	Power Consumption of machine with Direct coupling and inverter	-	4.52 kW
*	Power Saving	-	1.06 kW
*	Annual Saving for 35 m/cs	-	Rs.11,06,322/-
*	Investment	-	Rs.42,00,000/-

6 .Dyeing Machines Automation.

Automation of Dyeing machines is **trend Setter** in textile industry.

As the single machine automatic is common in the industry, where is the machine is controlled or programme individually, but in our case we have single CPU controlling many machines, each machine can be programmed from one computer, and once the programme starts there is no control at individual machine level. Thus the parameters like steam, water, temperature and time can be set and desired result can be achieved. This automation has resulted in tremendous saving in all forms of energy, dyes and has improved the quality and machine utilization. This has achieved due to removal of human control, which is main cause of error. The overall saving of power, steam, water, compressed air and dyes / chemicals, due to above automation is estimated at Rs.11.2 Lakhs, as against the investment of Rs.33 Lakhs (includes the cost of software).

Apart from the above benefits, there is improvement in quality, consistency in quality, which cannot be estimated presently.

7. Scouring machines automation with chemical dispensing unit.

Similar to Dyeing machine automation, we have done Scouring machine automation,

but with one more features i.e. automatic chemical dispensing unit. This is also **trendsetter** in the textile industry. Here we have removed the complete human control except feeding and delivery of fabric from the machine. Once the programme is set and the fabric is fed to machine, the CPU automatically starts the cycle as per set parameters, the required scouring chemicals are automatically fed into the machine and after completion of the cycle the machine gives signal. The complete removal of human interference has resulted in overall saving of power, water, steam, compressed air and chemicals.

The estimated saving	-	Rs.10,60,000/-
Investment including software and hardware cost	-	Rs.32,00,000/-

The implementation of various Energy Conservation measures have resulted in saving of Rs.103.30 equivalent of 5.2% of total energy cost of the plant.

Energy Conservation Plans & Targets :

To achieve further reduction in energy consumption following energy conservation projects plans are under active consideration :

* Improvement of Thermic Fluid Heating system.
* Replacement of old window air condition units by new efficient unit.
* Condensate recovery to be increased from 50% to 80%.
* Use of solar water heating at guest house and workmen canteen.
* Modification of existing boiler for using Bio-fuel in place of Furnace oil.
* Use of solar water heating for boiler feed water.
* Modification of weaving air washer plant.
* Colour and chemical dispensing system for Dyeing machines.

Environment & Safety :

Thane unit is an ISO 9001-2000 company and gives high importance to environment and safety. Effluent is discharged conforming to norms of Maharashtra Pollution Control Board. Treated effluent water is reused.

Daily 10 Lakhs Ltrs. of Effluent treated water is used for gardening, which is substitute for fresh water. To ensure green and healthy environment, trees plantation in the township and surrounding areas of the plant is a regular feature. Company has separate section to deal with environment activities and has separate environment laboratory. Plant gives equal importance to safety. Safety and fire protection equipments are provided in the plant.

RAYMOND LTD. THANE UNIT

BRIEF DESCRIPTION OF ENERGY CONSERVATION PROJECTS IMPLEMENTED DURING YEAR 2003 – 2004

We are furnishing details of each Energy Conservation Project in serial as appeared in table.

Sr. No. 1) We have lowered the False Ceiling Height of Spinning Department. The height of false ceiling was 16 Ft. in Spinning Department, but for normal working 12 Ft. height is sufficient. This lower height of false ceiling has resulted in reduction of around 62 TR of load on chiller plant of 350 TR.

The details of the savings are given below :

*	Load on 350 TR chiller plant with 16 Ft. height	-	210.0 kW
*	Load on 350 TR chiller plant with 12 Ft. height	-	172.8 kW
*	Reduction in load	-	37.2 kW
*	Annual Savings	-	Rs.11.10 Lakhs
*	Investment	-	Rs.16.50 Lakhs

Sr. No. 2) We have replaced existing Conventional Spray Nozzle by 25 Nos. Energy Efficient Atomiser in Spinning Air Washer.

The energy saving due to less resistance to water flow is as follows :

*	Load on water pump motor with Conventional Nozzle	-	39.2 kWh
*	Load of water pump motor with Energy Efficient Atomiser	-	32.0 kWh
*	Power Saving	-	7.2 kW
*	Annual Saving	-	Rs.2,15,000/-
*	Investment	-	Rs.1,36,000/-

Sr. No. 3) We have replaced existing Conventional Spray Nozzle by 52 Nos. Energy Efficient Atomiser in Weaving Air Washer.

The energy saving due to less resistance to water flow is as follows :

*	Load on water pump motor with Conventional Nozzle	-	76.4 kW
*	Load of water pump motor with Energy Efficient Atomiser	-	59.4 kW
*	Power Saving	-	16.9 kW
*	Annual Saving	-	Rs.5,03,954/-
*	Investment	-	Rs.2,52,000/-

Sr. No. 4) We have installed Effimax 4,000 Boiler Combustion Control System on 10 T/Hr. Boiler. This system accepts the signal from oxygen analyser control loop and maintains the oxygen level by controlling blower motor rpm. The blower motor rpm are controlled by VFD, which get signals from the Effimax system. Thus fine tuning of the combustion is done. This will ensure consistent air to fuel ratio over the complete load range irrespective of changes in variable parameters.

The details of the savings are given below :

*	Power Saving of blower motor due to less average load on motor	-	3.5 kWh
*	Fuel Saving due to better combustion efficiency	-	53.44 KL
*	Annual Saving	-	Rs.7,39,960/-
*	Investment	-	Rs.10,50,000/-

Sr. No. 5) We have installed Magnetic Scale Protector on the Condenser Water Pipeline of old Folding Air Conditioning Compressor. This has resulted in lower formation of scale and less load on pump motor.

The details of savings are given below :

*	Load on motor before installation	-	41 kW
*	Load on motor after 3 months of installation	-	37.59 kW
*	Power Saving	-	3.41 kWh
*	Annual Saving	-	Rs.66,936/-
*	Investment	-	Rs.70,000/-

Sr. No. 6) (a) We have replaced Vapour Absorption Chiller unit by Screw Compressor Chiller unit of 350 TR. The vapour absorption chiller is a steam based chiller unit. Due to increasing cost of Furnace Oil, the steam cost has increased upto Rs.1,000 per ton. Also due to aging of the unit, it has de-rated from its designed capacity of 450 TR. The new screw compressor chiller unit has more efficiency and hence consuming less energy per tonne of refrigerator.

The details of savings are given below :

*	Net Fuel Saving as no Steam is used by Chiller unit after adjusting equivalent electrical consumption of Screw Chiller	-	153.20 KL
*	Annual Saving	-	Rs.19,15,000/-
*	Investment	-	Rs.65,00,000/-

Sr. No. 6) (b) Since the flow requirement of Screw Chiller is less due to better cooling efficiency The power saving is also achieved on condenser and chiller water pump motor.

The details of savings are given below :

*	Power Saving due to reduction of load on pump motor	-	12.91 kWh
*	Annual Saving	-	Rs.3,85,000/-

Sr. No. 7) We have replaced 60 Nos. of 70 W Sodium Vapour lamps with 45 W Compact fluorescent lamps in the streetlight. The trials conducted last year have given positive result and we have changed all streetlight in our Mills.

The details of savings are given below :

*	Power Consumption of 70 W Sodium Vapour lamps (60 Nos.) per annum	-	14,308 kW
*	Power consumption of 45 W Sodium Vapour lamps (60 Nos.) per annum	-	7,884 kWh
*	Annual Saving	-	Rs.25,484/-
*	Investment	-	Rs.30,000/-

Sr. No. 8) In continuation of effort for rain water harvesting, we have covered still more area. The shed of Reeling Department is covered and water is collected and sent into our reservoir for process consumption.

The details of savings are given below :

*	Quantity of water collected	-	1,070 KL
*	Annual Saving @ Rs.242/- per 10 KL	-	Rs.25,894/-
*	Investment	-	Rs.10,000/-

Sr. No. 9) After successful trial on textool ring frame for direct tyre coupling and inverter, we have implemented the same on balance 35 machines.

The details of savings achieved are given below :

*	Power Consumption of machine with 'V' Belt drive	-	5.58 kW
*	Power Consumption of machine with Direct coupling and inverter	-	4.52 kW
*	Power Saving	-	1.06 kW
*	Annual Saving	-	Rs.11,15,322/-
*	Investment	-	Rs.42,00,000/-

Sr. No. 10) We have done cleaning of our three Water Reservoirs having capacity of 50, 50 & 100 Lakhs respectively. These have resulted in reduction of load on water softening plant and in the reduction of load on pump motor.

The details of savings are given below :

*	Power Saving – 15 HP motor – 6 Hrs. / Day	-	67.5 kWh
*	Power Saving – 40 HP motor – 2 Hrs. / Day	-	60.0 kWh
*	Annual Saving	-	Rs.1,58,418/-
*	Investment	-	Rs.90,000/-

Sr. 11) We have installed blowdown heat recovery system on 10 TPH Boiler.
No.

The details of savings are given below :

*	Saving due to flash steam recovery	-	Rs.2,10,900/-
*	Saving due to hot water heat recovery	-	Rs.1,29,175/-
*	Annual Total Saving	-	Rs.3,40,075/-
*	Investment	-	Rs.4,95,000/-

Sr. 12) **# We have done Automation of Dyeing Machines. This particular development**
No. **is Trend Setter in Textile Industry. As the single machine automation is common in the industry, where the machine is controlled or programme individually, but in our case we have single CPU controlling many machines, each machine can be programmed from one computer, and once the programme starts there is no control at individual machine level. Thus the parameters like steam, water, temperature and time can be set and desired result can be achieved. This automation has resulted in tremendous saving in all forms of energy, dyes and has improved the quality and machine utilization. This has achieved due to removal of human control, which is main cause of error. The overall saving of power, steam, water, compressed air and dyes / chemicals.**

The estimated saving	**-**	**Rs.11,20,000/-**
Investment including software and hardware cost	**-**	**Rs.33,00,000/-**

Apart from the above benefits, there is improvement in quality, consistency in quality, which cannot be estimated presently.

Sr. 13) **# Similar to Dyeing Machine Automation, we have done Scouring Machine**
No. **Automation, but with one more features i.e. automatic chemical dispensing unit. This is also Trend Setter in the Textile Industry. Here we have removed the complete human control except feeding and delivery of fabric from the machine. Once the programme is set and the fabric is fed to machine, the CPU automatically starts the cycle as per set parameters, the required scouring chemicals are automatically fed into the machine and after completion of the cycle the machine gives signal. The complete removal of human interference has resulted in overall saving of power, water, steam, compressed air and chemicals.**

The estimated saving	**-**	**Rs.10,60,000/-**
Investment including software and hardware cost	**-**	**Rs.32,00,000/-**

Apart from the above benefits, there is improvement in quality, consistency in quality, which cannot be estimated presently.

Sr. 14) After observation and study, it is found that there is scope for power saving, if
No. present condenser pump and chilled water pump are replaced by energy efficient pump on Screw Compressor and chiller. We have replaced the condenser and chilled water pump, with energy efficient pump.

Note : **# - Trend Setter.**

The details of savings are given below :

*	Motor load of condenser pump	-	35 kW
*	Motor load of chilled water pump	-	41 kW
*	Motor load with energy efficient condenser pump	-	24 kW
*	Motor load with energy efficient chilled water pump	-	30 kW
*	Saving in Power	-	20 kW
*	Annual Saving	-	Rs.5,95,400/-
*	Investment	-	Rs.8,50,000/-

Sr. No. 15) After taking the required trials, we have changed the conventional copper chokes by energy efficient electronic chokes.

The details of savings are given below :

*	Load with conventional chokes	-	34 W
*	Load with electronic chokes	-	28 W
*	Saving in Power (2,000 chokes)	-	12 kW
*	Annual Saving	-	Rs.3,59,800/-
*	Investment	-	Rs.5,00,000/-

Sr. No. 16) We have installed On-line demand based monitoring system for our compressors. Based on the actual demand of compressed air, the system automatically starts or stops the running of compressor. As the system is PLC based, the response time is very fast as compare to mechanical system, hence the fine tuning of the compressors working is possible.

The details of savings are given below :

*	Average energy meter reading before installation	-	3,580 kW
*	Average energy meter reading after installation	-	3,350 kW
*	Power Saving	-	230 kW
*	Annual Saving	-	Rs.2,85,775/-
*	Investment	-	Rs.3,85,000/-

Sr. No. 17) We have installed Solar Water Heater above Staff Canteen. The hot water is used for dish washing in the Canteen. Previously steam is used for heating the water.

The details of savings are given below :

*	Saving for 1,000 Ltrs. of water	-	55.64 MkCal
*	Annual Saving	-	Rs.80,316/-
*	Investment	-	Rs.1,20,000/-

Sr. 18) No. Through our Small Group Activity, we have received this suggestion. We have recovered the cooling water of vacuum pump of cimi steaming machine.

The details of savings are given below :

*	Total quantity of water recovered	-	1,890 KL
*	Annual Saving (Cost of water – Rs.242/- per 10 KL)	-	Rs.45,738/-
*	Investment	-	Rs.8,000/-

Sr. 19) No. It is observed that the Textool Ring Frame was having two separate suction duct running across the length with two separate suction fans and motors. Through our in-house R&D, we have successfully tried and modified the same. The two ducts are converted into one single duct with one suction fan motor on one machine. The same will be implemented for all machines in future.

The details of savings are given below :

*	Load on Suction Motor (two) with Double Duct	-	4.5 kW
*	Load on Suction Motor (one) with Single Duct	-	2.93 kW
*	Power Saving	-	1.57 kW
*	Annual Saving	-	Rs.49,600/-
*	Investment (for modification)	-	Rs.30,000/-

Sr. 20) No. Through our Small Group Activity initiatives, we have a special group dedicated to steam traps. This group is surveying the steam trap every month. The report is prepared and faulty traps are replaced. Also one group member take a round of the plant every week to inspect the steam traps. All these exercise has considerably reduced the faulty steam traps and resulted in saving valuable thermal energy.

The details of savings are given below :

*	Fuel Saving due to regular monitoring and checking of traps	-	23.66 MkCal
*	Annual Saving	-	Rs.29,000/-
*	Investment	-	Rs.3,000/-

Sr. 21) No. This is one more area where our Small Group has effectively saved energy, On every Mill holiday, the compressed air group checked the leakage of compressed airline, as it is easy to locate the leakage on holiday due to noise. The same is stopped immediately. This is also very effective in reducing load on compressor, the exact saving is difficult to established, but it is around 50 kW of lower load with minor repair expenditure.

The details of savings are given below :

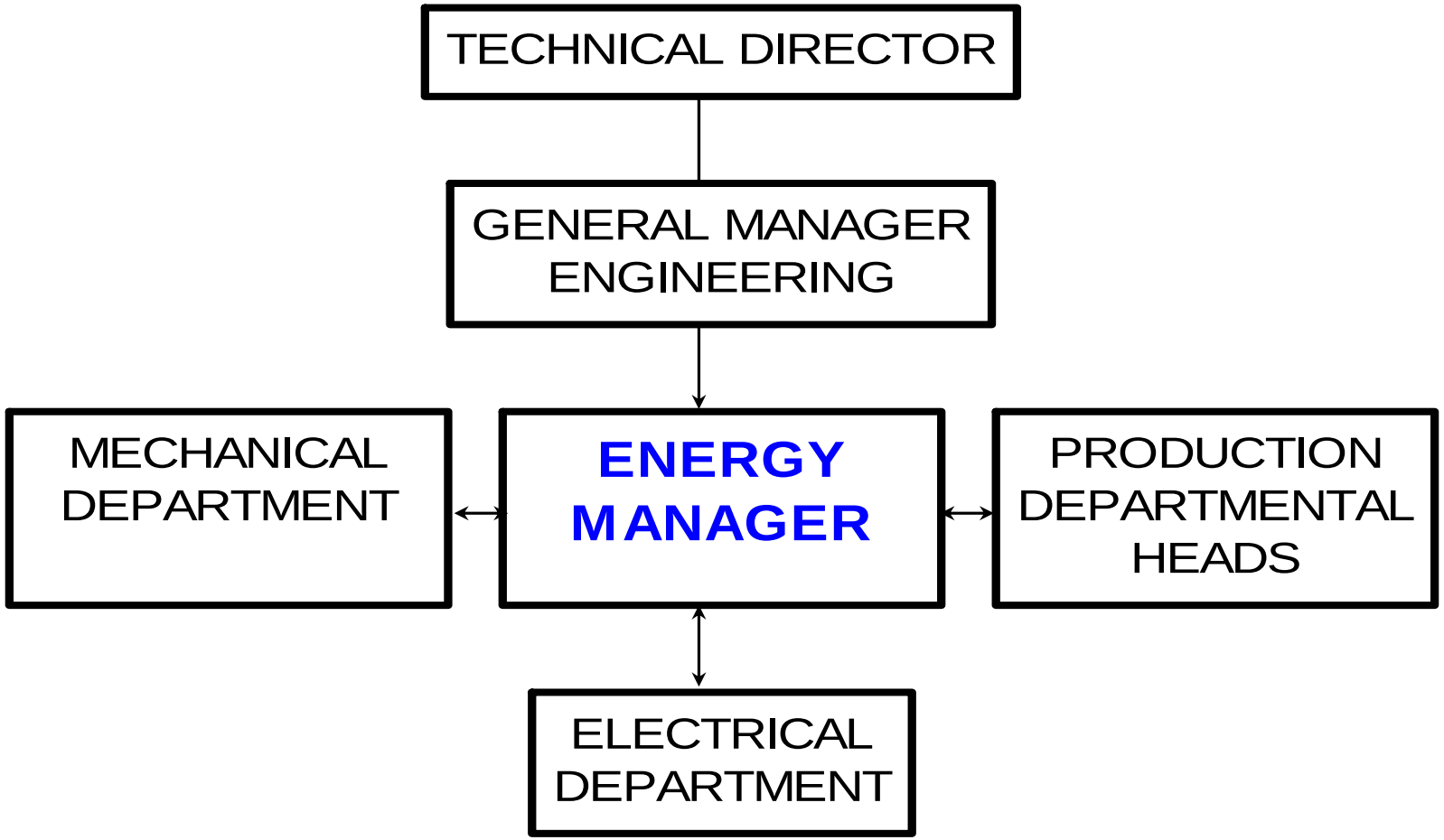
*	Annual Saving in Power	-	0.75 Lacs kWh
*	Annual Saving	-	Rs.26,000/-
*	Investment	-	Rs.2,000/-

Sr. 22) No. We have lowered the existing fittings over the accumulator and removed extra fitting without affecting the illumination level in our Weaving Department.

The details of savings are given below :

*	Energy Consumption of 80 Nos. tubelights removed	-	69.12 kWh / day
*	Annual Saving	-	Rs.85,881/-
*	Investment	-	Rs.26,624/-

ORGANISATION CHART



RAYMOND LTD. THANE PLANT

PROCESS FLOW CHART