

Maral Overseas Limited Madhya Pradesh



MARAL OVERSEAS LIMITED is a group Company of renowned LNJ Bhilwara group. The LNJ Bhilwara group founded by Shri Laxmi Niwas Jhunjhunwala has a global presence. MOL plant was set up in the year 1989 as 100% Export oriented, vertically integrated Textile manufacturing Unit (An ISO 9001 accredited Co.). This is one of the few textile Cos. to have facilities of Spinning, Knitting, Processing & Garment manufacturing at single location. MOL has the honour to have supplied articles all over to the world known Cos., e.g., NIKE, MARKS & SPENCERS, HUGO BOSS, MANGO, ERICA, TIMBERLAND etc.

The Company is managed by well qualified and experienced Managing Director Shri. Shekhar Agarwal. The Plant level management is headed by the President, Shri. R.K. Khandelwal along with other functional Heads, Staff members & Associates.

(ii) Energy Consumption

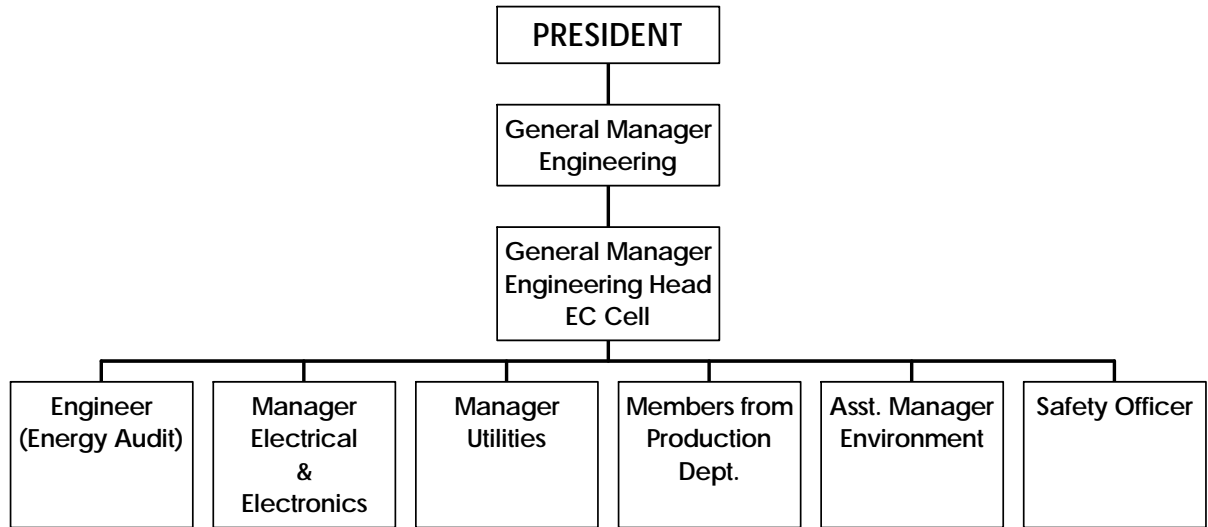
Include information on total energy consumption (i.e., Coal, Oil, Gas, Electricity and money value.) Information on energy consumption in terms of percentage of manufacturing cost should also be presented. Also, it should highlight the specific energy consumption for the period 2002-03, 2003-04 & 2004-05. Good Graphic Presentation related to specific energy consumption may also be incorporated.

Specific Power Consumption Details	Unit	2002-03	2003-04	2004-05
Annual Production				
Cotton Yarn	MT	12166.6	9952.95	11845.58
Knitted fabric	M.T.	3	1377.23	1685.67
Dyed fabric	M.T.	2120.91	936.44	1442.67
Garments	Lakh	1453.86	21.82	14.27
	pcs/year	25.59		
Total Energy consumption per annum				
Cotton Yarn	Lakhs KWH	407.27	347.36	385.84
Knitted fabric		5.16	4.32	4.13
Dyed fabric		36.37	31.67	31.85
Garments		11.77	10.87	8.13
Total Thermal energy consumption	MKCal/Year	2130.60	6664.93	1184.77
Total manufacturing cost in Rs. Lakhs	Rs. Lakhs	16093.1	18451.2	23907.2
Total Energy Cost in Rs. Lakhs	Rs. Lakhs/ Year	1123.3	1044.34	1379.45
Energy cost as % of Raw material cost	%	18.75	12.17	12.5
Specific Power Consumption (Yarn) (Overall)	UKG	3.34	3.49	3.25
Specific Thermal Energy consumption (Dyed Fabric)	MKCal/MT	8.66	7.96	5.88

* During the year 2003-04, it was strike and slow working in the factory.

- (iii) **Energy conservation commitment, Policy and Organisational set up.**
(Please indicate a photocopy of units energy Conservation Policy, if decided)

ENERGY CONSERVATION CELL ORGANISATION SET UP



- (iv) **Energy conservation achievements**
(Include One paragraph on each major energy conservation project implemented during the year 2004-05 only.

Note:

Calculations shown herein under are annualized basis, whereas, the chart in Point No. 13 attached shows the actual savings achieved during 2004-05 upto March '05.

01. Voltage Optimisation

♦ **Background**

During the Energy Audit, it was observed that the percentage loading of almost all the motors is between 50 to 70%.

♦ **Observation**

It was tried for 1 No. Motor with voltage variac and found in the experiment that at voltage level of 380 – 390, an unloaded motor upto 80% performs efficiently. The power factor was found to be improved and the total power consumption was less by around 3 to 4 %

In the Textile industry the trend of unloaded motors normally prevails. It was decided and the over all voltage of the Plant was brought down to 390 V and we found a reduction of 2% in over all power consumption.

The cost involved for this exercise was NIL. It is recommended that for the textile industry this project can be undertaken elsewhere to. Therefore, we call it as a **TREND SETTER.**

02. Improvement in Compressed Air Pipe line Design & Layout

♦ **Background**

In the Compressed air system there were no. of bends in the suction side as well as discharge side. By reducing those bends, the pressure-drop in the discharge side was reduced.

♦ **Observation**

We Installed the Energy Metre to check improvement in power consumption after making the above changes and found the saving in energy.

- ♦ **Technical & Financial analysis**

The power saving per day after modification was found to be 371 KWH per day.

Amount Invested NIL

03. Improvement in Water supply line Design & Layout

- ♦ **Background**

In the Water supply system also there were no. of bends in the suction side as well as discharge side. By reducing those bends, the pressure-drop in the discharge side was reduced.

- ♦ **Observation**

We Installed the Energy Metre to check improvement in power consumption after making the above changes and found the saving in energy.

- ♦ **Technical & Financial analysis**

The power saving per day after modification was found to be 55 KWH per day.

Amount Invested NIL

04. Optimisation of Blower speed of Fabric Finishing M/c

- ♦ **Background**

The finishing Machine is originally designed for the fabric delivery of 60 Mtr./Minute, while the production taken from the machine for certain quality constraints is at only 30 Mtr./Minute.

- ♦ **Observation**

Looking to this fact, the Motor Pulley was reduced by 25 mm in order to reduce the Blower speed. By reducing the Blower speed, the power consumption of the finishing machine reduced, since, the power consumption of Fan is proportionally to 3rd power of machine speed.

The pulley size before saving 180 mm; after modification 160 mm.

- ♦ **Technical & Financial Analysis**

The power consumption before modification : 20.1 KW

The power consumption after modification : 14.8 KW

Total power saving : 5.3 KW

Amount invested NIL

05. Replacement of Oversize Motors

- ♦ **Background**

In Ring Frame section the humidification plant was designed for 80000 CFM, whereas, the actual conditions in the department could be achieved with only 60000 CFM due to the reason that actual heat load was lesser than the designed condition.

- ♦ **Observation**

To reduce the plant's CFM, the Blade Angle of Fan was re-adjusted due to which the power consumption of the Fan was reduced. This necessitated replacement of Motor in the Plant.

♦ **Technical & Financial Analysis**

The actual load came down to 13 KW. Therefore, the motors (3 Nos.) were replaced with 22 KW capacity motors connected in star.

The motor installed before modification	: 37 KW
The motor installed after modification	: 22 KW
Load drawn by motor before modification	: 18 KW
Load drawn by motor after modification	: 13 KW
Total Motors replaced	: 3 Nos.

Total power saving : 5 KW x 3 = 15 KW

Amount Invested NIL

06. Replacement of Garden Lights from Sodium Vapour to CFL



Background

The lights provided in the Garden (18 Nos.) were 70 Watts each. Moreover, the fixture provided for these Luminor were opaque due to which the quantity of light actual used for lighting the Garden area becomes less.

♦ **Observation**

These lights were replaced by 18 Watts CFL fittings with transparent fixtures. The lux output from these fixtures were found to be equivalent to the earlier fixtures.

♦ **Technical & Financial Analysis**

Total lighting load before modification	: 70 x 18 = 1.26 KW
Total lighting load after modification	: 18 x 18 = 0.32 KW

Total power saving : 0.93 KW
: 0.93x8x365 = Rs. 0.8825 Lakhs

Total amount invested : Rs. 750 x 18 Nos. = Rs. 0.135 Lakhs
Pay back period : 0.15 Years

07. Maximisation of WHRB Operation

♦ **Background**

Maral Overseas Ltd., has 2 Nos. of Waste Heat Recovery Boilers capacity of 1.8 MTPH & 0.8 MTPH each.

1x3 TPH Oil fired Boiler is also installed for the purpose of process heating in the Dye House.

♦ **Observation**

Before optimization, the pressure settings of these Boilers was as under:

Oil fired Boiler : 8 Kg/Cm²
WHR Boiler : 6 Kg/Cm²

♦ **Technical & Financial Analysis**

During the Energy Audit, it was found that the running hours of WHRB was 15 -16 hours/day, while operation of Oil fired Boiler was 7 - 8 hours/day. The pressure settings was changed and was carried out as under:

Oil fired Boiler : 6 Kg/Cm²
WHR Boiler : 8 Kg/Cm²

After the study, we found the Oil fired Boiler's working hours came down from 8 Hrs./day, approximately 2 hrs./day, while the WHRB steaming was done for approximately 20-23 hrs./day.

The additional steam per day from WHRB was found to be approximately 200 Kgs/hour.

Increase in output per day : 200 Kgs. x 24 = 4800 Kgs per day

**Saving per year : 4800x363x0.72
= Rs. 12.54 Lacs**

Amount invested NIL

08. Improvement in WHRB efficiency by proper maintenance

♦ **Background**

During the audit, it was found that WHRB output per hour is less than the installed capacity.

♦ **Observation**

From the records, we following points were observed:

- a. The Soot Blower not working
- b. The water washing (Gas side) was not regularly carried out.
- c. Boiler water TDS level was not maintained.

♦ **Technical & Financial Analysis**

The above maintenance jobs were carried out and the efficiency of WHRB found improved by 20%.

WHRB Capacity = (2.8+0.8)x0.2x0.72x363 = Rs. 13.59 Lakhs
Amount invested NIL

09. Improvement in Oil fired Boiler efficiency by proper maintenance

♦ **Observation**

From the records of Oil fired Boiler, following facts were observed:

- a. Boiler water TDS was not maintained.
- b. There was Carbon deposit inside the tubes (Gas side).

- ◆ **Technical & Financial Analysis**

The evaporation ratio before maintenance : 13.5

The evaporation ratio after maintenance : 14.1

10. Saving in lighting power in non-production region



Background

Task lighting concept was introduced in the Garments section at MOL. By re arranging the lighting circuits & lighting fixtures, the lux level at the specific task centre was improved, simultaneously reducing the lighting in non productive regions.

- ◆ **Observation**

Thus reducing the total lighting power consumption by 300 - 400 KWH/day, depending on the production.

11. Replacement of conventional ballast with electronic ballast

- ◆ **Background**

The fact that the conventional Copper Ballast consumes more power than the Electronic Ballast has been taken into consideration in factory area.

- ◆ **Observation**

The total power consumption per single tube light fixture in conventional ballast is 52 Watts, while the electronic ballast is only 36 Watts.

- ◆ **Technical & Financial analysis**

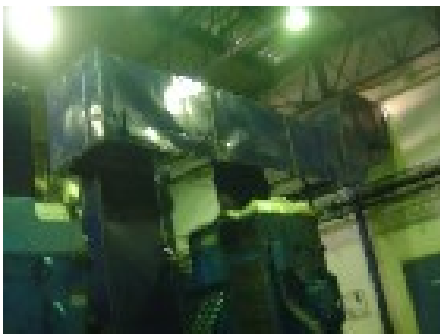
Total No. of ballast replaced : 500

Saving achieved per day : 1560 KWH

Amount of Investment Rs. 370/ Ballast

Pay back period – 1 Year

12. Providing exhaust duct on alternators of Wartsila DGs



Background

MOL has Oil fired Wartsila DG power at Plant with a total capacity of 6.75 MW. The engine room has to be well ventilated for keeping the ambient temperature to normal.

- ♦ **Observation**

There are various sources for heat liberation from the D.G. Set. Out of those sources, the major source is the Alternator exhaust, which is left into engine room. The alternator exhaust was drawn out of the engine room through ducting system to reduce the heat load of the Engine room. The ventilation system has following axial flow Fans:

1. 2 x 15 KW
2. 2 x 11 KW

- ♦ **Technical & Financial Analysis**

Out of the above, 1 No. 11 KW Fan kept stopped maintaining the same ambient temperature in the Engine room. This has given a saving of 30000 KWH per year.

Saving is Rs. 98000/year

Amount of Investment is Rs. 50000/-
Pay back period 6 months.

13. Recycling of Machine Cooling Water from Dye House

- ♦ **Background**

In the Dyeing machine, liquor heating is carried out with tubes by Heat Exchangers. After the heating cycle, the cooling is carried out by cold water and after cooling the Heat Exchangers, the water was let out into the drain.

- ♦ **Observation**

This water was taken back to the underground water tank and recycled in the machine again.

- ♦ **Technical & Financial Analysis**

The quantity of water re-used is 300-500 per month depending on the production.

The cost of saving is Rs. 2000/month. Saving per year is Rs. 24000/-

14. Heat utilization from Effluent



- ♦ **Background**

The effluent discharge from Dyeing machines in process house has temperature between 80-90°C.

- ♦ **Observation**

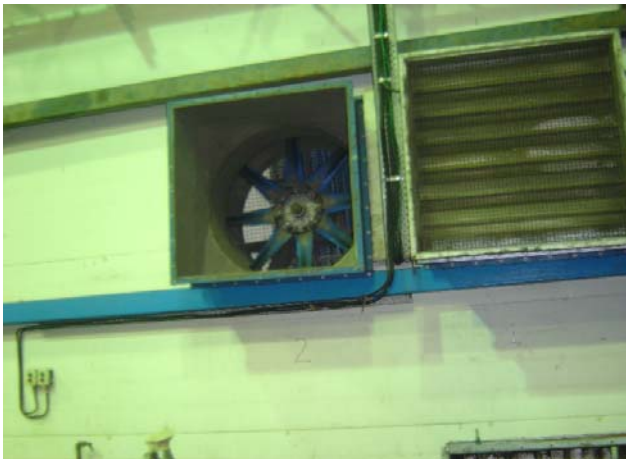
The heat in the effluent was extracted by heating cold water from ambient temperature to 55°C & more through Heat exchanger. The water thus heated is utilized in dyeing machines.

- ◆ **Technical & Financial Analysis**

Quantity of water heated	: 5.5 Ltr/Second
Total working hours of system	: 22 hours
Total quantity of water heated	: 5.5 x 3000x20 = 360 KL/day
Rise in Temperature	: 16°C
Total working hours per year	: 7750
	: $\frac{5.5 \times 3600 \times 7750 \times 16 \times 0.8}{600} \times 0.72$

Total saving per year = Rs. 23.60 Lakhs

15. Replacement of existing Fans with FRP Fans in Ventilation system of Wartsila Power Plant



- ◆ **Background**

The ventilation system installed in the Wartsila DG House were Dye cast Aluminium Axial Flow Fans. These Fans were replaced by efficient FRP Fans.

- ◆ **Observation**

The air volume output from these 6 fans before and after installation was checked and found to be that there is no reduction in air volume.

The reduction in power consumption by FRP Fans is 20%

- ◆ **Technical & Financial Analysis**

Total connected Load	: 11 KW
Saving per year	: 7200 KWH
Saving Rs.	: 23000/-

Amount Invested Rs. 3000/-
Pay back period – 1.3 Years

16. Condensate & Flash Steam recovery

- ◆ **Background**

Steam condensate and Flash recovery system has been installed by us.

- ◆ **Technical & Financial Analysis**

The saving calculation is as under:

Total condensate recovery : 30 KL/day
 ΔT : 48°C
 Total flash steam recovery : 6% of total condensate
 Enthalpy of Flash Steam : 500 Kcal/Kg.

$$\frac{30000 \times 0.8 \times (80-32)}{600} + \frac{30000 \times 0.06 \times 500 \times 0.8}{600}$$

= 3.12 Tons/day

Total savings per year : 3.12 x 0.72x90 = 2.02 Lakhs

17. Replacement of existing undersized pipeline in Garment section and reducing steam supply pressure



Background

There was a problem of steam pressure drop in Garments section. It was observed that the requirement of steam in Garment section had increased while the size of pipeline supplying the steam to Garment section remained unchanged during the past few years.

♦ **Observation**

In order to meet the steam requirement of Garments section, the supply pressure in Garment steam line was kept at 6-7 Kg/Cm². The pipe size which was 40 NB was replaced with 65 NB pipe line, in order to meet the whole requirement of steam quantity for Garment pressing section. After the replacement of pipeline, the pressure was reduced to 4 Kg.

♦ **Technical & Financial Analysis**

The savings are as under:

Enthalpy between 6 Cm² & 4 CM² : 8 Kcal

Total heat saving Kcal/Kg	: 8 Kcal/Kg
Total Steam utilization per day	: 15000 Kg
No. of working days	: 180 (Calculated for 6 Months)
Enthalpy of steam	: 600 Kcal/Kg
Evaporation Ratio	: 14
Cost of Fuel saved	: 11.74
(Fuel rate Rs. 11.74 per Kg.)	: $\frac{8 \times 15000 \times 180}{600} = 36000$
	: $\frac{36000}{14 \times 1000} = 2.57$
	: $\frac{2.57 \times 11.74 \times 1000}{10000} = 0.30$ Lakhs

Total Saving in Rs. : 0.30 Lakhs

18. Conversion of SKODA DG Sets from HSD to LDO

♦ **Background**

The DG sets working during the shut down period was utilizing HSD as fuel. Since the cost of Diesel being higher, the substitution of fuel was thought of.

- ♦ **Observation**

LDO having slightly higher Calorific value than HSD, but slightly sedimental was thought of using in DG Sets.

A sediment separator was installed and the LDO was used as a fuel in DG set after separation.

- ♦ **Technical & Financial Analysis**

Diesel Rate per Litre	: 20.69
The rate of LDO	: 17.79
Difference	: 2.4
Total LDO consumed	: 1400000

Total Saving : Rs. 4.06 Lakhs

19. & 20. Reduction in fuel consumption on Thermopack TP 06 & 10 by interlocking

- ♦ **Background**

The thermic fluid heating is used in fabric dryers. During the period when no fabric is running in the machine, the machine stands running in idle hours also for cooling down Oil circulation pump of thermic fluid, simultaneously the burner used to keep on and off continuously.

When the machine is not in production and is in stopped condition, the thermic fluid burner should be kept off.

- ♦ **Observation**

Keeping above in mind, the drying machine was interlocked with the thermic fluid heater oil fired burner so that we got savings during machine stoppage hours.

- ♦ **Technical & Financial Analysis**

TP 06

Avg. fuel consumption per kilo of fabric drying	: 0.553 before Interlocking
Avg. fuel consumption per kilo of fabric drying	: 0.342 after interlocking

Total production	: 39.627 MT
Saving in fuel	: 0.211 Kilo/Kg Fabric dried
	: 39.627x0.211x11.74

Total Saving in Rs. : 0.98 Lakhs

TP 10

Avg. fuel consumption per kilo of fabric drying	: 0.23 before Interlocking
Avg. fuel consumption per kilo of fabric drying	: 0.18 after interlocking

Total production	: 54.63 MT
Saving in fuel	: 0.042 Kilo/Kg Fabric dried
	: 54.63x0.042x11.74
Fuel	: Rs. 11.74/Kg.

Total Saving in Rs. : 0.27 Lakhs

20. Recycling of Compactor Cooling Water

- ♦ **Background**

The fabric compacting machine has heating rollers on Felt calendaring side, which are cooled by fresh water during the machine operation. The cooling water which was not re-used earlier is taken to underground tank from where it is re-used to the machines.

♦ **Technical & Financial Analysis**

Total quantity of water recycled : 15 KL
 Cost of Water : Rs. 5/KL
 No. of working days/year : 362
 : $\frac{15 \times 362 \times 5}{100000} = 0.27 \text{ L}$

Total saving in Rs. : 0.27 Lakhs

21. Reduction in fuel consumption by monitoring fuel quality operation and maintenance

♦ **Background**

The DG sets of Wartsila are running on HFO. The HFO was purchased from BPCL having sulphur content of 3-3.5%. The source of HFO purchase was changed from BPCL to IOCL, Koyali.

♦ **Observation**

The sulphur content in IOCL fuel was only 1.5-2.0%. This has given us reduction in fuel consumption. The differential pressure of cooler and filters of charge air system was maintained to 200 mm WC. This has given added saving in fuel consumption.

♦ **Technical & Financial Analysis**

Total power generation per day : 135000 KWH
 Saving : 1 gram/KWH = 135 KL grams
 Per day consumption : 135 Kg
 Savings per year : 135 x 330 days
 : = 44.550 MT/year

Total saving in Rs. : 5.24 Lakhs

22. Installation of Solar Water Heater for Staff Hostel



Background

The bachelor hostel inside the factory premises for the Engineers accommodation has 36 rooms. Each room containing 1 KW Geyser. Solar water Heater for this building was installed.

♦ **Technical & Financial Analysis**

Total connected Load : 36 x 1.5 KW = 54 KW
 No. of working hours : 1.5 Hours
 Total units consumed per day : 72

Cost of Solar Heater	: Rs. 3.00 Lakhs
Cost of power saved	: 26280×3.25
Total power consumption/year	: $72 \times 365 = 26280$ KWH
Payback period	: $26280 \times 3.25 = 3.5$ years

23. Installation of Gobar Gas Plant for Staff Mess



Background

The factory has staff mess facility. This staff mess consumes 3 LPG Cylinders per day.

The factory also has 40 Nos. of Cows. The Gobar Gas plant was installed to make use of the cow dung in a proper way.

♦ **Technical & Financial Analysis**

After installation of Gobar Gas plant, the usage of LPG Cylinders was totally stopped. The saving workings are as below:

Cost of One LPG Cylinder : Rs. 300
Total cost per year : Rs. 300x3x365 = 3.28 L

Total savings in Rs. : 3.28 Lakhs

24. Improvement in Yarn recovery by process optimization (By improving the maintenance and machine settings).

♦ **Background**

Machine maintenance audit of Spinning department was carried out. The recommendations of machine maintenance audit were followed and by proper maintenance and machine settings, the yarn recovery had improved by 1%.

♦ **Technical & Financial Analysis**

Total yarn production per year : 11845 MT
1% of production : 118450 Kg
Units per Kg. : 2.77
Power saved : 118450 Kg x 2.77 = 328106

Total saving in Rs. : 328106x3.25 = 10.06 Lakhs

25. Saving in Autoconer power consumption by regular monitoring of suction leakages. (Work practice related)

♦ **Background**

Autoconer winding machine have suction system for the purpose of breaker yarn trap. The suction is required only when there are breakages in any of the 60 running spindles. When there is no breakage, the suction pressure is not required. But, when there is fewer breakages, less suction is required and vice versa.

♦ **Observation**

The suction pressure was controlled by Inverter drive for controlling the suction motor speed, at full speed the suction pressure measure is 50 Milli Bars, while after installing the energy saving inverter drive, the normal running pressure is 27 Mill Bars. Due to variable speed drive, the power saving takes place. When there is any leakage of suction then also the demand for speed increase in the suction motor arises.

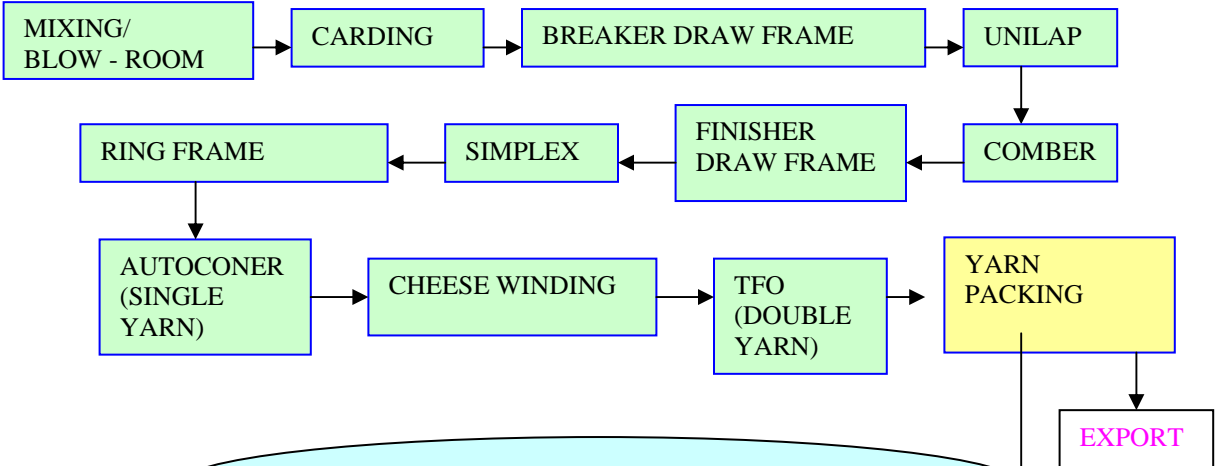
During the machine operation due to negligence, the Doffer, Shutter and the butterfly valve leakages occurs. When these leakages were controlled by regular monitoring of power consumption on these machines a saving between 200-400 KHW/day was observed and maintained.

Total saving in Rs. : 5.33 Lakhs per year

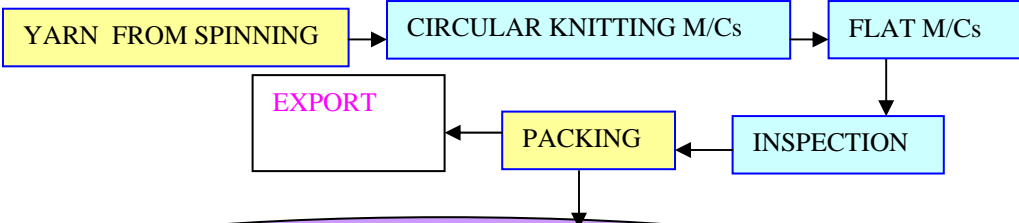
(v) Energy conservation Plans & Targets

Energy Conservation Measures (Planned)	Anticipated savings in		Approx. investment (Rs.)	Project commencement & completion year.
	Energy Value	Rs. Lakhs		
Laying of addl. Cables	0.48 LKWH	1.57	3.85	Completed in the month of September '05
Energy efficient Pump with Energy Efficient Pump	2.44 LKWH	7.9	3.87	Targeted in November 05
Installation of Electrical drives for Pumps	1.87 LKWH	6.07	10.1	Commissioning in progress
Replacement of Existing Fans with Energy efficient FRP Fans	0.74 LKWH	2.40	5.3	Commissioning in progress
Electronic drive for Fans	0.64 LKWH	2.08	4.3	Commissioning in progress
Air Compressors – Savings in Specific power	9.89 LKWH	32.97	87.30	Targeted in March '06
Replacement of existing pumps, motor & Foot valves at narmada Pumping station	0.38 LKWH	1.23	1.75	Targeted in Dec 05
Conversion of electrical heating to Steam heating on Wartsila	3.62 LKWH	11.76	26.82	Targeted in Jan 06
Heat Recovery from Compressor Exhaust	378.57 KL	NA	NA	Targeted in Mar 06
Replacement of Oil fired Boiler to Coal fired Boiler	--	138.52	90	Targeted in Mar 06
Replacement of Oil fired Thermic Fluid Heater to Coal fired Thermic Fluid Heater	--	35.32	60	Targeted in Mar 06
TOTAL	20.06 LKWH POWER & 378.57 KL OIL	239.82	148.49	

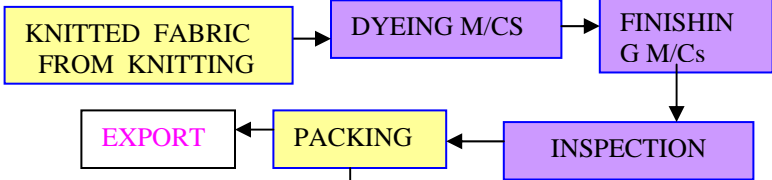
SPINNING DEPARTMENT



KNITTING DEPARTMENT



DYEING DEPARTMENT



GARMENT DEPARTMENT

