



Lucas-TVS Limited

Automobile Industry, Padi (Chennai)

UNIT PROFILE

Lucas-TVS is a part of the TVS group. It was setup in 1961 as a joint venture of Lucas Industries plc, UK and TV Sundaram Iyengar and Sons at Chennai to manufacture automotive electrical systems.



Lucas-TVS is a leader in Auto-electrical manufacturing. Lucas-TVS manufactures a complete range of auto electrical products consisting of direct drive and gear reduction Starters, internal and external fan alternators, wipers, fan motors, blower motors, window lift motors, mechanical and electronic distributors, cam sensors, headlamps etc.

The mother plant, being at padi - chennai, LTVS has its manufacturing units at Rewari, Pondicherry, Chakkan & Rudharapur.

“ ENERGY MANAGEMENT OBJECTIVES “

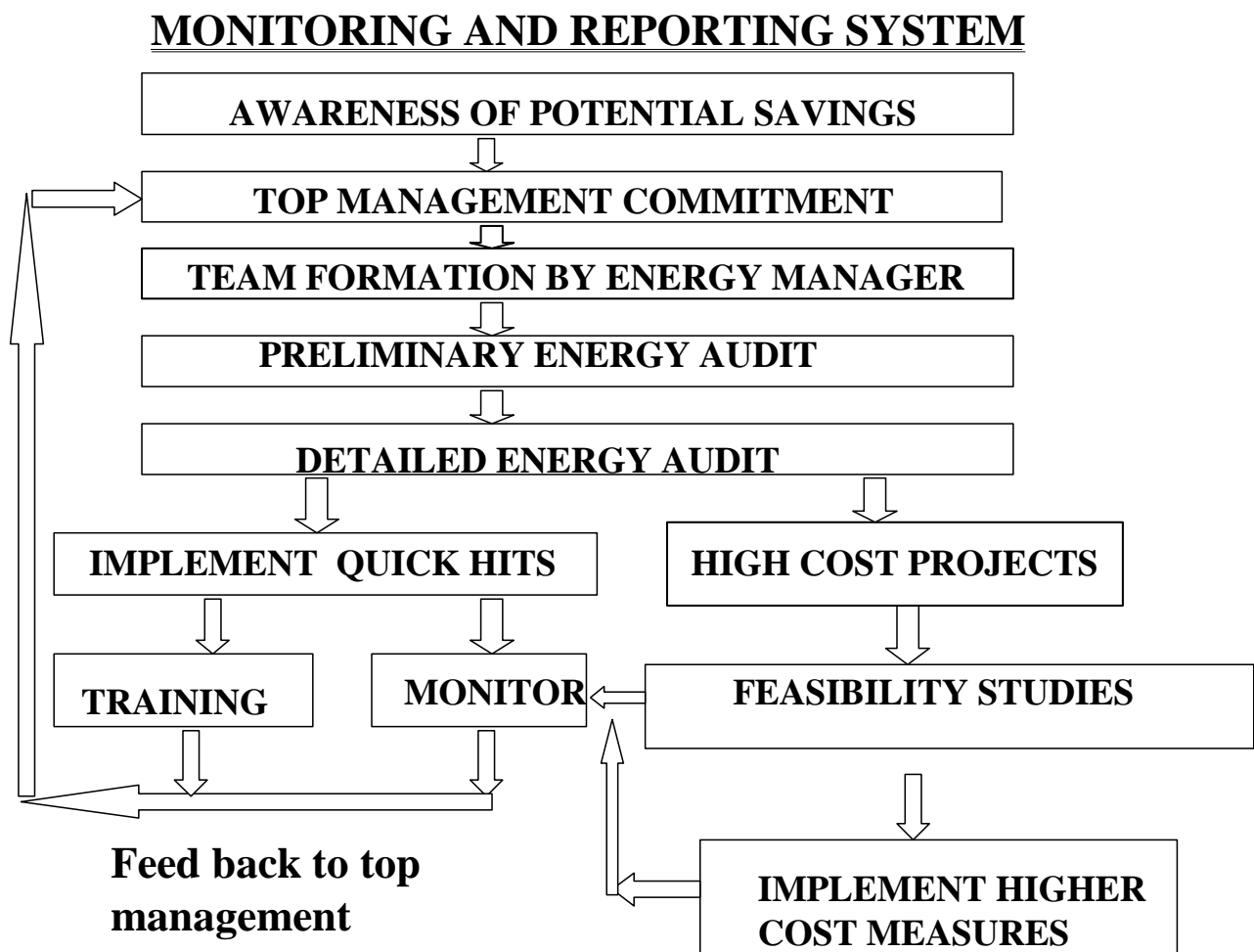
We are committed to reduce the Specific Energy consumption per product on continual basis by various continuous improvements and projects.

SUCH AS:

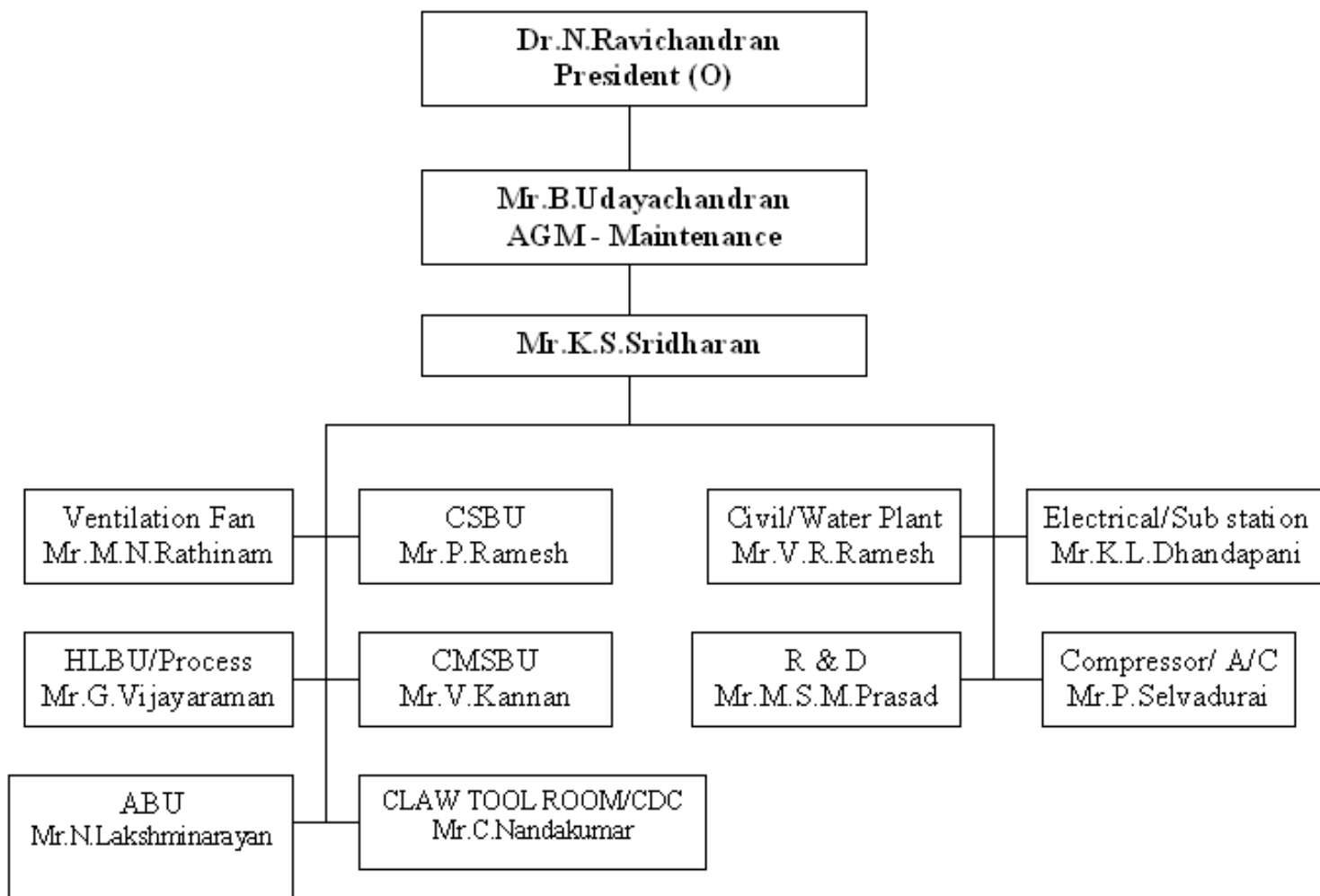
1. Optimum capacity utilization
2. Elimination of unwanted machine movements / Elements
3. Introduction of VFD & optimizing motors depending on load
4. Waste elimination – reduce, reuse and recycling critical resources.
5. Technology up-gradation with energy efficient processes and equipment's.
6. Continuous awareness / training programs for employees and suppliers.
7. People involvement through suggestion schemes and small group activities
8. Manufacturing relay out and cell formations to reduce lighting and ventilation load.
9. Strict adherence to Government norms & regulations

ROLE OF ENERGY MANAGER

- Prepares Annual Plan with Targets and Budget
- Establish an Energy conservation cell within the firm with managements concern about the mandate and task of the cell.
- Acts as a Facilitator in implementing the Encon Projects
- Interacts with core team members / cross functional team periodically to review the progress
- Constitutes a team of Auditors to monitor the Retainment of Improvements
- Presents the achievements to Top Management

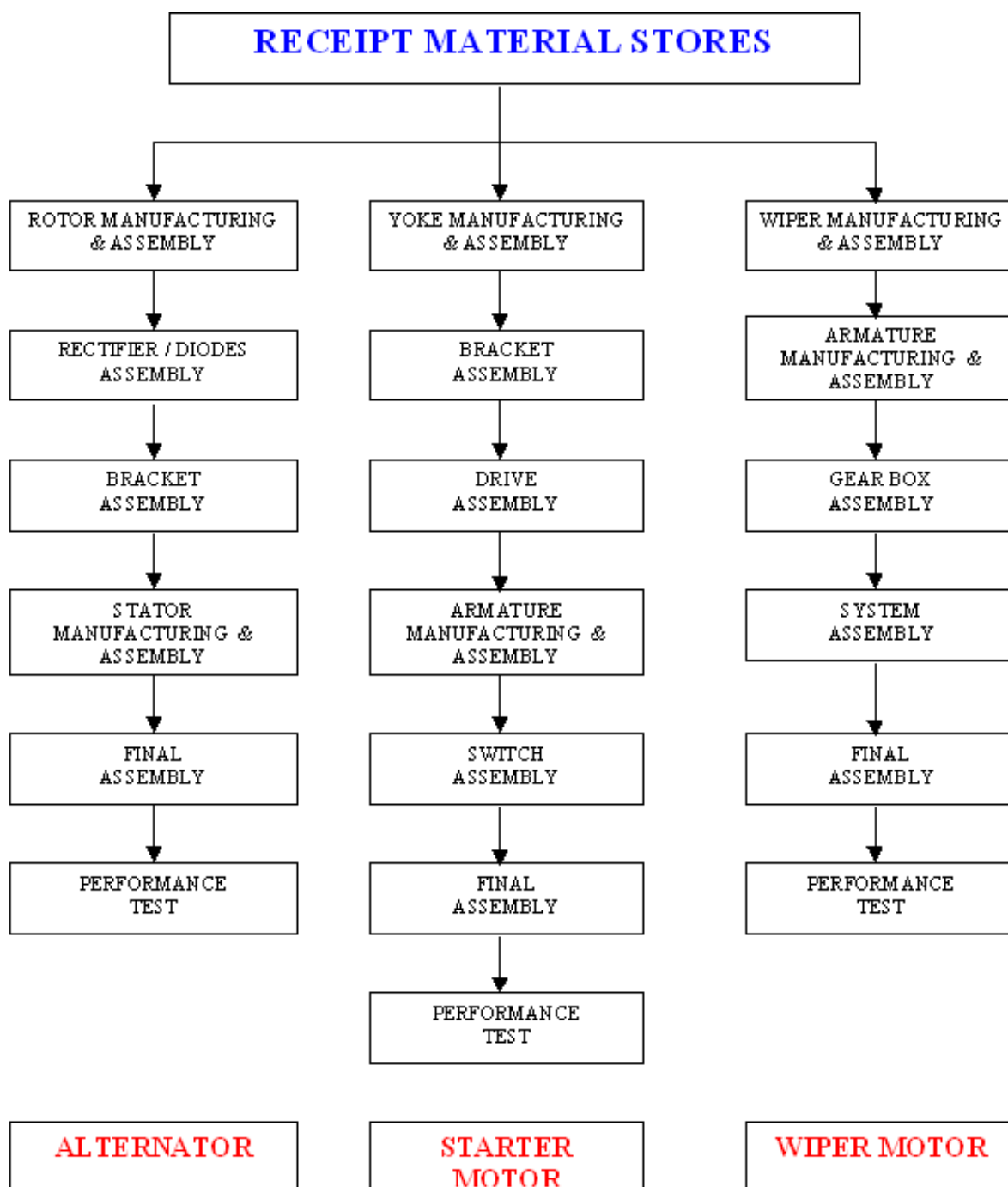


ENERGY CONSERVATION ORGANIZATION - STRUCTURE



ENERGY CONSERVATION ACHIEVEMENTS

During the period 2007 – 2008 Lucas – TVS Ltd has implemented around 12 projects through Engineering initiatives and workman’s suggestion schemes resulting into total saving of Rs. 195.55 Lacs with an investment of Rs. 595 Lacs. This has been resulted in a reduction from 13.2 units per product to 13.0 units per product in specific electrical energy consumption.



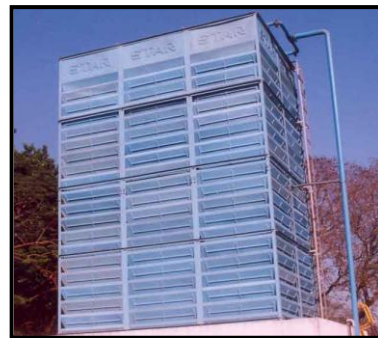
ELECTRICAL SAVINGS

2006 - 2007

A. Introduction of blower less cooling tower



BEFORE



AFTER

Before installation:

10 HP motor is used for cooling purpose in each cooling tower.

Motor capacity (10HP X 5 Nos) = 50 HP

Power consumption per annum = 1.80 Lakhs units

Operating cost = 8.37 Lakhs / Annum

After installation:

Motors are eliminated due to natural cooling.

Motor capacity = Nil

Power consumption per month = 0 units

Operating cost = Nil

Saving = Rs. 8.37 Lakhs / Annum

B. Replacing high consumption Air conditioners 15 Nos.



BEFORE



AFTER

Before installation:

45 Nos. of old and high consumption air conditioners were used.

Power consumption per annum = 3.47 Lakhs

Operating cost = 16.2 Lakhs

After installation:

45 Nos. old Air conditioners are replaced with timer controlled new high efficiency Air conditioners

Power consumption per annum = 2.20 Lakhs

Operating cost = 10.3 Lakhs

Saving = Rs. 5.9 Lakhs

C. Exhaust duct provision for screw compressor.



BEFORE



AFTER

Before installation:

Compressor exhaust hot air re – circulated and the suction air temperature increased 5° C from the ambient.

Power consumption per month = 1,97,000

Operating cost = Rs. 9.16 Lakhs

After installed Exhaust duct.

Suction Air temperature reduced to ambient level. Hence energy consumption reduced 5 units/Hour and Current consumption from 155amps to 145 amps

Power consumption per month = 1,71,000 units

Operating cost = Rs. 7.96 Lakhs

Saving = Rs. 14.4 Lakhs / annum

D. Genset Cooling system changed from cooling tower to coil cooling



BEFORE



AFTER

Before installation:

Forced cooling tower with 15 HP jack water pump and 10HP blower motor for cooling the engine.

Power consumption per annum = 0.90 Lakhs

Operating cost = 4.185 Lakhs

After installation:

Replaced the cooling tower by coil cooler and eliminated the 15 HP jack pump.

Power consumption per annum = 36000 units

Operating cost = 1.67

Savings = Rs. 2.5 Lakhs / annum

Water savings = 5000 Kilo litres / year

E. Introduction of scroll chillers

Reciprocating chiller converted to scroll chiller



AFTER

Before installation:

10 HP motor is used for cooling purpose in each cooling tower.

Motor capacity (10HP X 5 Nos) = 50 HP

Power consumption per annum = 1.80 Lakhs units

Operating cost = 8.37 Lakhs / Annum

After installation:

Motors are eliminated due to natural cooling.

Motor capacity = Nil

Power consumption per month = 0 units

Operating cost = Nil



F. Linear Head For Shaft Feeding Arrangement In Induction Hardening Machines

Before installation:

The feed system for shaft in the induction-hardening machine is by a hydraulic pump and cylinder. The variable feed rate is achieved by selecting the flow control valves.

| | |
|-----------------------------|--------------------------|
| Motor capacity | = 3 HP |
| Power consumption per annum | = 10800 Kwh |
| Operating cost | = Rs. 0.54 Lakhs / annum |

After installation:

The hydraulic system is replaced with synchronous motor operated linear feed head. The current consumption during operation is 60Watts.

| | |
|-----------------------------|------------------|
| Motor capacity | = 60 Watts |
| Power consumption per annum | = 180 KWh |
| Operating cost | = Rs 900 / annum |

Saving = Rs. 0.53 Lakhs / annum / machine.

Total savings – Rs 3.7 Lakhs / annum

G. Introduction of Solid State Power source in place of MG set in Starter Performance testing rig

Before installation:

25 HP motor is used as prime mover for DC Generator, which produces 0 – 30 VDC for a load upto 2000 Amperes. The motor runs throughout the day.

| | |
|-----------------------------|------------------------|
| Motor capacity | = 25 HP |
| Power consumption per annum | = 0.78 Lakhs units |
| Operating cost | = Rs 3.9 Lakhs / Annum |

After installation:

Solid State electronics controlled power supply that consumes power only during Testing is used. The average testing time per starter is 10 seconds and daily production per line is 400 nos. The power consumption during idle time is 150 Watts.

| | |
|-----------------------------|-------------------------|
| Idle power consumption | = 150 Watts |
| Power consumption per annum | = 0.048 Lakhs units |
| Operating cost | = Rs 0.24 Lakhs / Annum |



Saving = Rs. 3.66 Lakhs / Annum

H. Modification of Infra Red Heater array in Armature varnishing plant

Before modification:

The armatures are pre heated and cured in the conveyorised plant, which has 180 IR heaters installed in the sides. Each heater is of 500 Watts.

| | |
|-----------------------------|-------------------------|
| Total heater capacity | = 90 kW |
| Power consumption per annum | = 2.70 Lakhs units |
| Operating cost | = Rs 13.5 Lakhs / Annum |

After modification:

The IR Heater array was re-positioned to optimize heat radiation and 40 Heaters were removed retaining the operating efficiency of the plant. Now the no. of heaters is 140 only.

| | |
|-----------------------------|-------------------------|
| Present heater capacity | = 70 kW |
| Power consumption per annum | = 2.10 Lakhs units |
| Operating cost | = Rs 10.5 Lakhs / Annum |

Saving = Rs. 3.0 Lakhs / Annum

I. Elimination of ONE pump in 150 Ton Yoke Sizing Presses (two machines)

Before modification:

One 75 HP and One 25 HP motors are used to drive 3 Pumps for a capacity of 150 Ton operation. The actual load requirement is 50 Ton. The actual usage time is 10 Hours (900 yokes X 20 seconds X 2 shifts) the idle power consumption is 400 KWH.

| | |
|-----------------------------|-------------------------|
| Motor capacity | = 100 HP |
| Power consumption per annum | = 3.0 Lakhs units |
| Operating cost | = Rs 15.0 Lakhs / Annum |

After modification:

The utilized capacity is 50 Ton. The idle time power consumption is reduced by cutting off the 25HP motor and running only the 75HP motor. There is no increase in cycle time, which is 20 seconds.

| | |
|-----------------------------|-------------------------|
| Present motor capacity | = 75 HP |
| Power consumption per annum | = 2.6 Lakhs units |
| Operating cost | = Rs 13.0 Lakhs / Annum |

Saving = Rs. 4.0 Lakhs / Annum (For 2 machines)

J. Elimination of High pressure compressed air for agitation by using High Volume Low Pressure blower at auto plating



Before



After

Before Installation:

Power consumed per annum = 40500 units

Operating cost = 1.88 Lakhs

After Installation

Power consumed by the compressor = 27000 units / annum

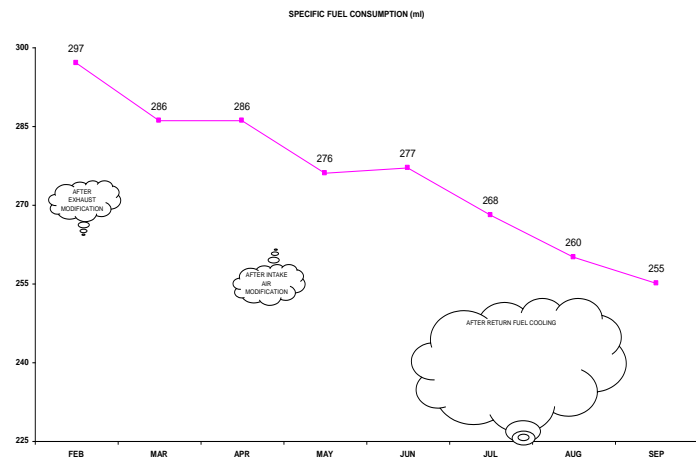
Operating cost = Rs. 1.25 Lakhs

Savings = 0.63 Lakhs / annum.

Fuel savings in captive Genset (Trendsetter).



SPECIFIC FUEL CONSUMPTION (ml)



Improvements:

- ❖ Exhaust system straight outlet chimney modified from canopy outlet.
- ❖ To reduce the suction air temperature the air inlet pipes were extended to three metres away from the engine where the air had nearly ambient temperature
- ❖ The return fuel is cooled through heat exchanger to reduce the temperature

Before improvement SFC – 3.36 units per litre of Diesel

After improvement SFC – 3.9 units per litre of Diesel

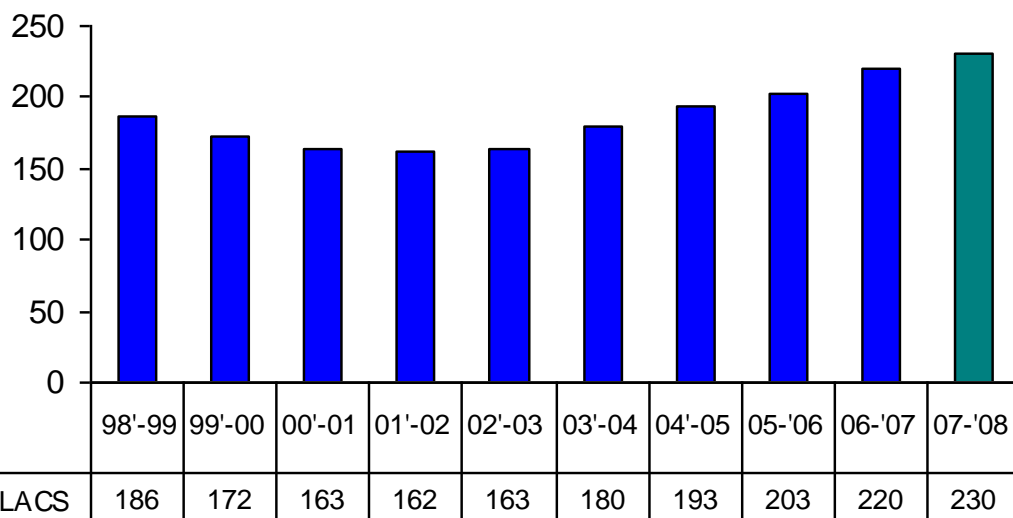
Benefits:

This improvements has resulted in the savings of 10930 litres per annum of HSD

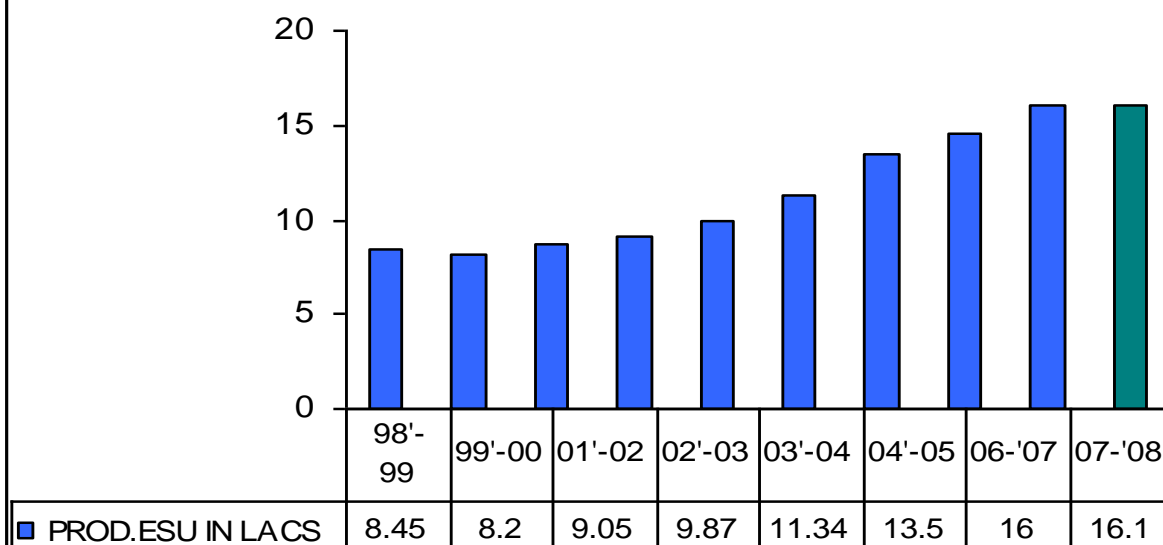
Fuel saving due to SFC reduction = 29 ml per unit

Savings = Rs. 29.5 Lakhs

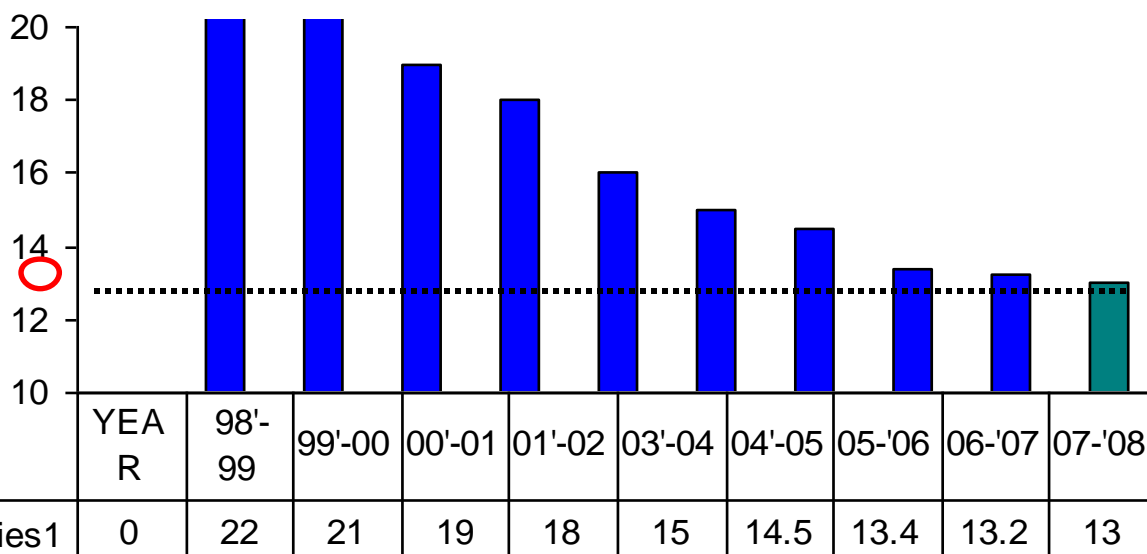
ENERGY CONSUMPTION UNIT IN LACS



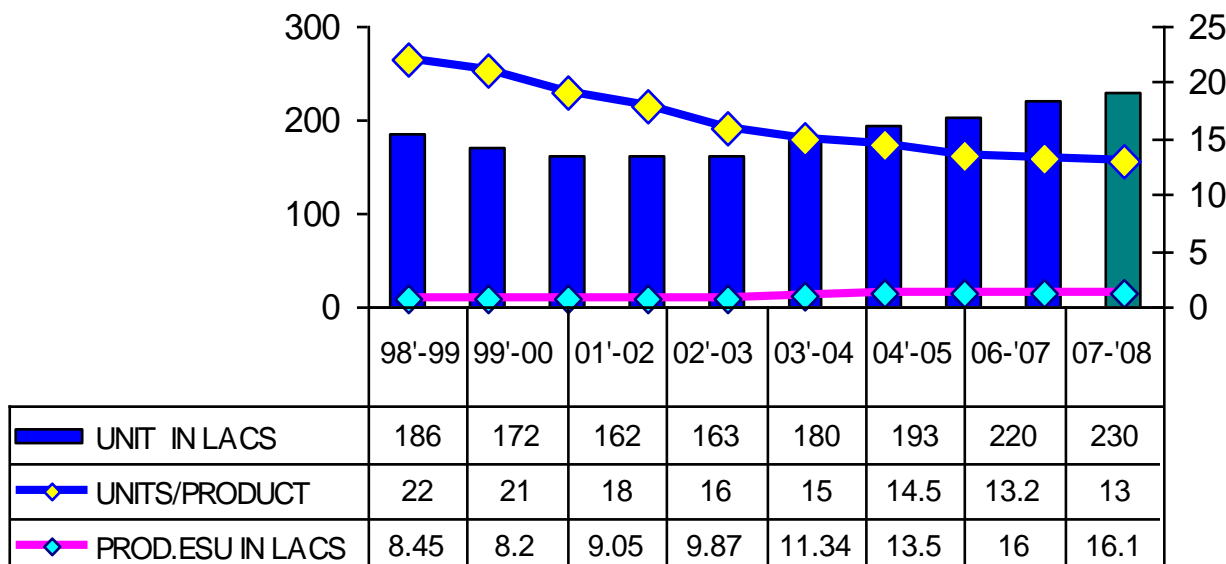
PRODUCTION UNITS IN LACS



SPECIFIC UNITS PER PRODUCT



OVERALL ELECTRICAL UNITS & PRODUCTION



ENERGY CONSERVATION FOR THE YEAR 2005 –2006

| S.No | Title of Energy saving project Implemented | Savings In Lakhs | Investment in Lacs |
|-------------|---|-------------------------|---------------------------|
| 1. | Introduction of VFD for compressor | 18.0 | 12.00 |
| 2. | Replacement of in-efficient compressor | 10.0 | 9.00 |
| 3. | Blower less cooling tower | 8.37 | 10.00 |
| 4. | Replacement of in-efficient A/C units | 1.2 | 2.00 |
| 5. | Solar water heater for canteen | 1.50 | 4.00 |
| 6. | Replacement of in-efficient transformer | 4.00 | 9.00 |
| 7. | Ring main system for compressed Air system | 2.50 | 3.00 |
| 8. | Sleep timers for dust collectors | 0.50 | 0.20 |
| 9. | Energy efficient motor for utilities | 2.00 | 2.00 |
| 10. | Star Delta star converter for high power machine | 2.00 | 1.00 |
| 11. | Introduction of AC drive motors in place of DC motors | 1.00 | 2.0 |
| 12. | Power management during off peak hour and lunch hour | 4.00 | 0 |
| | TOTAL | 53.07 | 54.2 |

ENERGY CONSERVATION FOR THE YEAR 2006 –2007

| S.No | Title of Energy saving project Implemented | Investment In Lacs | Savings In Lacs |
|-------------|--|-------------------------------|----------------------------|
| 1. | Replacing high consumption Air conditioners 15 Nos | 3.0 | 2.2 |
| 2. | Introducing screw compressors in place of Reciprocating air compressors - 2 Nos | 20 | 8.9 |
| 3. | Introducing 2 nos. blower less cooling tower | 4 | 3.3 |
| 4. | Introducing heat exchanger in place of 15 TR chiller Plant at IF0005 induction hardening machine – CMSBU | 1.5 | 0.99 |
| 5. | Air leak audit & correction | - | 5.0 |
| 6. | Energy efficient pumps (4 nos.) | 1.8 | 2.5 |
| 7. | Exhaust Duct provision for Screw Compressors | 1.5 | 2.2 |
| 8. | Reduction in cooling tower pump capacity-compressor house pump room | - | 3.3 |
| 9. | 40HP INEFFICIRNT compressor removed | - | 6.7 |
| 10. | Compressor cooling pump 10HP not in use | - | 1.67 |
| 11. | Head lamp chiller plant modification 30TR to 3 TR | 1.5 | 9.0 |
| 12. | 12 nos. of Solar power street light installed for remote area | 2.0 | 0.25 |
| 13 | Air cooled fluid cooler for IY0017 860 KVA Genset and IY0045 1000 KVA - 2 Nos | 3 | 1.25 |
| | TOTAL | 38.3 | 47.26 |

ENERGY CONSERVATION FOR THE YEAR 2007 –2008

| S.No | Title of Energy saving project Implemented | Investment In Lacs | Savings In Lacs |
|-------------|--|-------------------------------|----------------------------|
| 1. | Energy conservation through power factor improvements | 14.4 | 3.2 |
| 2. | Reduction of Fuel consumption by increasing Grid power | 8.0 | 84.0 |
| 3. | Energy conservation through distribution loss reduction | 60.0 | 23.0 |
| 4. | Street Light Energy Saver | 1.0 | 0.50 |
| 5. | Replacing of Diesel Fork lifter by Electric battery operating Fork lifter | 3.2 | 14.4 |
| 6. | Energy Conservation through Load Sharing | 6.0 | 4.0 |
| 7. | Replacement of 1 H.P wall mounting fan into 180Watts pillar type fan | 3.2 | 5.6 |
| 8. | Reduction of Fuel Consumption | 17 | 9.6 |
| 9. | Temperature Reduction in shop floor | 300 | 25 |
| 10. | Introduction of Air cooled Screw Compressor | 12 | 5.0 |
| 11. | Energy conservation through gravity force introduced for sewage collection by removing motors. | 3.34 | 1.9 |
| 12. | Energy conservation through conversion of Mono-block pump to Submergible pump | 1.5 | 2.5 |
| 13 | Automatic Heat Treatment Process | 2.17 | 16.85 |
| | TOTAL | 431.81 | 195.55 |

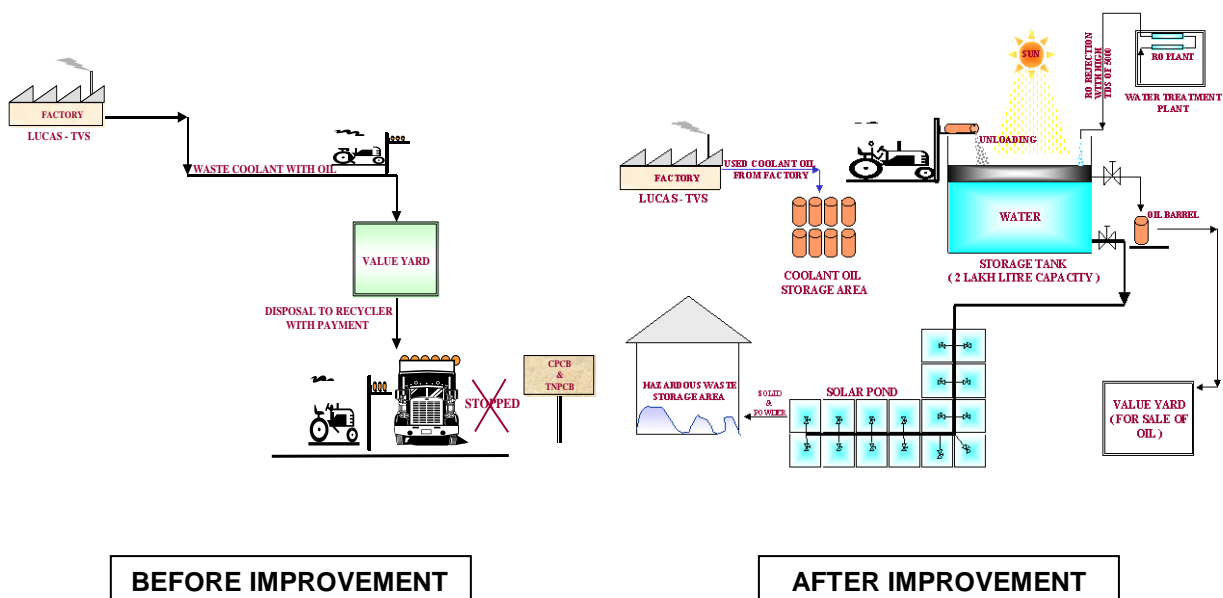
We at Lucas TVS are committed to Protection, preservation and improvement of the environment by continually orienting our activities, products and services.

INNOVATIVE TECHNOLOGY FOR ENERGY AND ENVIRONMENT

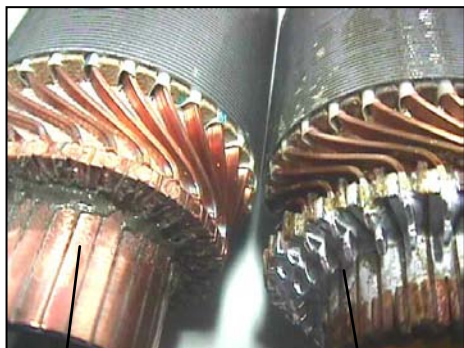
One of the remarkable contributions this year was the establishment of indigenous waste coolant treatment system, which was not done before by any of the industries in the world, which involves recovering waste oil from waste coolant, thereby the quantity of waste disposed has reduced by 55% compared to last year.

ENVIRONMENTAL AND ENERGY BENEFITS

- This process is unique one. It uses RO Rejection water & solar evaporation for coolant oil treatment process.
- No Chemical treatment is involved in this process whereas other companies are using chemicals & Electrolysis for treatment.
- High TDS water (RO Reject) disposal problem is solved.
- Meeting out the PCB standard to sell the oil for recycling (0.8% water & 99.2% oil against PCB norms of 15 % water & 85% Oil)
- Cost saving Rs 6.52 lacs per annum.
- Energy Consumption is very less



Next to this the reduction of lead soldering stations for armatures by the introduction of brazing method, and also a new system for solder recovery from waste lead solder dross where by we can able to reduce the solder waste disposed.



**BRAZED
ARMATRE AFTER
IMPROVEMENT**

**LEAD SOLDERED
ARMATURE BEFORE
IMPROVEMENT**

ENVIRONMENTAL AND ENERGY BENEFITS

- Elimination of usage of lead in product
- Power consumption is reduced from 0.7 units to 0.3 units per armature
- Design scrap reduction (Copper saving) due to raiser less commutator from 60% to 33%.
- **Total energy savings of 1.8 Lacs units/year**

ENERGY CONSERVATION AND ENVIRONMENT AWARENESS PROGRAM

Periodical training of employees & awareness programs for employees families, contractors and suppliers are done by LTVS on continuous basis



RAIN WATER HARVESTING



Development of greenery, rainwater harvesting, water conservation are an important part of our routine activities with significant increase in production and man power, the overall water consumption of the factory has been reduced by 5% by rain water harvesting, improved ground water levels and greenery development.

GREENERY DEVELOPMENT



Total requirement of gardening water is managed by recycling the sewage water 100%. About 300 numbers of tree saplings were added to our green belt this year.

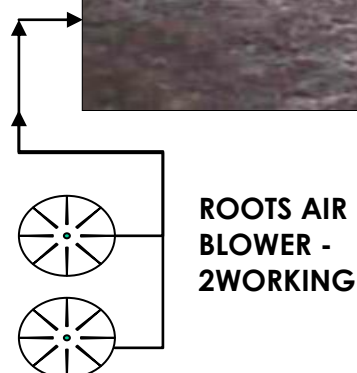
INTRODUCTION OF FLUIDIZED AERATION BED IN PLACE OF SURFACE AGITATOR FOR SEWAGE TREATMENT

We could able to save a considerable amount of energy by the introduction of Fluidized aeration bed in sewage treatment plant in place of surface aeration by agitator.



POWER CONSUMPTION IS 25 KW/HOUR

BEFORE IMPROVEMENT



POWER CONSUMPTION IS 18 KW/HOUR

AFTER IMPROVEMENT

TOTAL ANNUAL POWER SAVINGS: 75000 UNITS PER ANNUM

ENERGY SAVINGS DUE TO THE SOLAR EVAOPARTION OF POND IN PLACE OF ELECTRICAL HEATING SYSTEM



Energy savings due to elimination of Electrical Heater: 72000 UNITS PER ANNUM

WASTE TO WEALTH FROM CANTEEN WASTE THROUGH BIO-COMPOSTING PROCESS



We are utilizing the canteen waste to generate manure by the way of Bio-composting.



SAFETY

Ensuring employees safety and safe work place is one of the major objectives of our company. Maintenance of safety standards, adherence to safety rules and regulations are prime responsibility of Human Resources, Works Engineering, Safety and Manufacturing Departments.

Periodical audits to identify the areas for improvement are done by each department's safety teams. Major safety improvement projects are triggered by Safety department, whereas the day to day improvements related to machinery & work places are identified and implemented by active involvement of employees through small group activities and TPM movement.

Some of the safety improvements in 2007 – 08 are:

- Introduction of Photo guards in 125 presses / machines.
- Introduction of two hand safety on all hydraulic & pneumatic presses.
- ELCB introduction on all mobile electrical equipment's and hand tools.
- Double solenoid Brake clutch valve for all mechanical presses as an additional safety.
- Remote operation of High voltage switch gears in substations
- Ring main earthing stations for the electrical installations.