



Mahindra & Mahindra Ltd.

Automotive Sector, (Mumbai)

Mahindra

Unit Profile:

The 4.5 billion US\$ Mahindra Group is among the top 10 industrial houses in India. The Automotive Sector of the company has been a full participant in the robust growth of the automobile industry. It is engaged in the production of Multi Utility Vehicles, Sports Utility Vehicles and three wheelers. The company has now entered in the passenger car market through a subsidiary company Mahindra Renault PVT.LTD. by launching mid sized sedan Logan. The success of the refreshed Scorpio and the Bolero variants helped the company to grow substantially in the hard top MUV sub segment. The Automotive Sector has five manufacturing plants, three in the state of Maharashtra located at Kandivli, Igatpuri & Nashik, fourth in Andhra Pradesh located at Zaheerabad and fifth at Haridwar in Uttaranchal state. The sector's strategy focuses to surpass customer's latent desires by unleashing the passion of the people.

With over 60 years of manufacturing experience, the group has built a strong base in technology, engineering, marketing and distribution which are key in its evolution as a customer centric organization. The group has ambitious global aspirations and has a presence on five continents.

The Automotive Sector Kandivli Plant has been received QS-9000, TS-16949, TPM excellence award from JIPM (Japan Institute of Plant Maintenance) ,Golden Peacock award in corporate governance 2006, ISO-14001 and OHSAS-18001 certification for maintaining and implementing practices related with Safety, Health and Environment.

The Kandivli plant has received National Energy Conservation Award from 2003 to 2006 from Ministry of Power, Govt of India. The plant has also received State Level Energy Conservation Award – First prize in Automobile and Engineering Sector in the year 2004 and 2005.

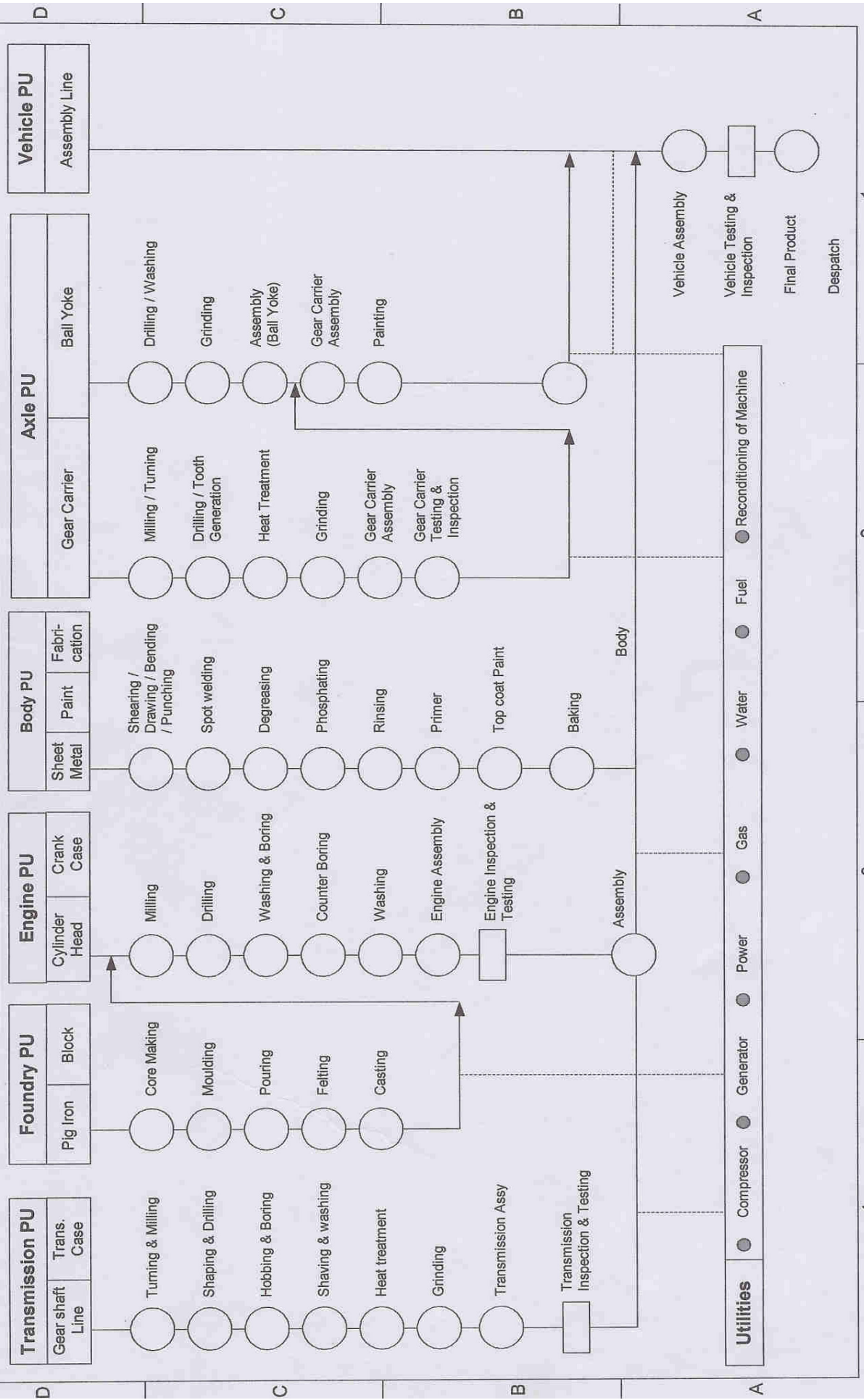
In order to have a competitive edge on product, we continuously improve, modernize and enhance the quality of the product through various process improvement carried out through new technology in the manufacturing process. The company is working on Clean Development Mechanism (CDM) & various Energy Efficiency improvement initiatives.

The company has always recognized that the business has to be sensitive enough to perceive the needs of the society in which the corporate operates. The company therefore believes that the weaker sections of our society need help and support for them to be self reliant. The company focuses on various social programmes like setting up schools, a Project ' Nanhi Kali' to support girls in rural and tribal areas in various parts of India by providing academic and material support, society, donation of Cochlear Implants for hearing impaired children, mid day meal kitchen for children, plantation of one million trees through Mahindra Hariyali Projects.

The company is spreading the message on Energy conservation to employees, suppliers, nearby schools, societies etc. by creating various awareness campaigns. Various Small groups have been formed with senior executive as a facilitator to identify & implement the Energy Efficiency Projects.

Mahindra & Mahindra Ltd. Automotive Sector -Kandivli

Process Flow Diagram



Energy Consumption:

Specific Electrical and Thermal Energy Consumption has been reduced considerably by adopting various Energy Efficiency.

DESCRIPTION	UNIT	2004-2005	2005-2006	2006-2007
Annual Eq. Vehicle production	Nos.	66589	64895	67749
Total electrical energy consumption /annum	Lacs kWh	358	331	330
Specific energy consumption – Electrical	Units/Eq. Vehicle	538	510	488
Total Thermal(Fuel) Consumption/annum	MKCals	23939	22043	22114
Specific energy consumption – Thermal (Fuel)	MKCals /eq. Vehicles	0.359	0.340	0.326

YEAR	ELECTRICITY		THERMAL (FUEL)	
	Consumption (kWh / Eq. Vehicle)	% reduction over 2004 - 2005	Consumption (MKCals/ Eq. Vehicle)	% reduction over 2004 – 2005
2004-2005	538	-----	0.359	-----
2005-2006	510	5.20%	0.340	5.29%
2006-2007	488	9.29%	0.332	9.19%

Energy Conservation Commitment, Policy and Set Up

Mahindra Auto Sector, Kandivli Plant is committed for practicing Energy Modesty and Efficiency. The company has given more thrust on small group activities for improving Energy Efficiency in the plant. Each team comprises of senior executives as facilitators with members of all sections including involvement of workmen. They are assessing short, medium and long term opportunities for Energy Savings and Conservation. Kandivli Plant targets all sources of energy like Electricity, Natural Gas, Kerosene, High Speed Diesel, and Water for conservation and efficiency improvement projects. The main objective of the cell to reduce specific electrical and thermal energy consumption with less environmental effect.

Top management like President, Vice President, General Managers actively participate in the Energy Conservation Programme and support the Energy Conservation plans by providing the necessary budgetary and morale help. Budget provisions are made exclusively for Energy Efficiency Projects.

Energy Conservation week is celebrated during 14th December to 21st December 2006

A stall has been displayed for CFL's during the week..

Energy Conservation Poster, Slogan and Suggestion Competition is conducted. The winners of the competition are awarded.

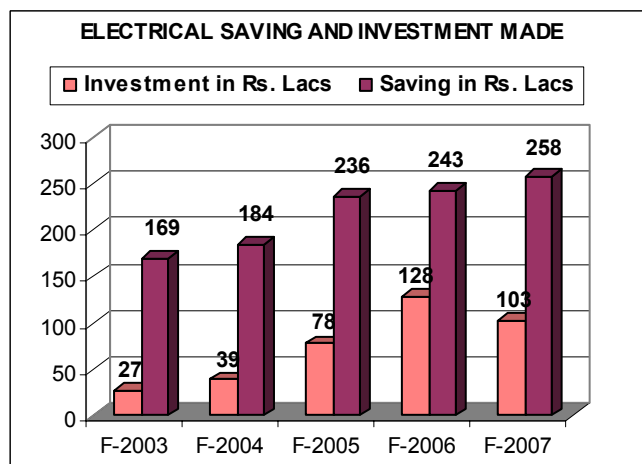
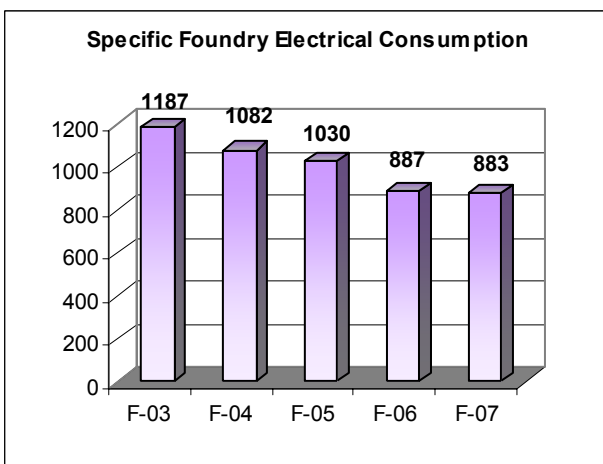
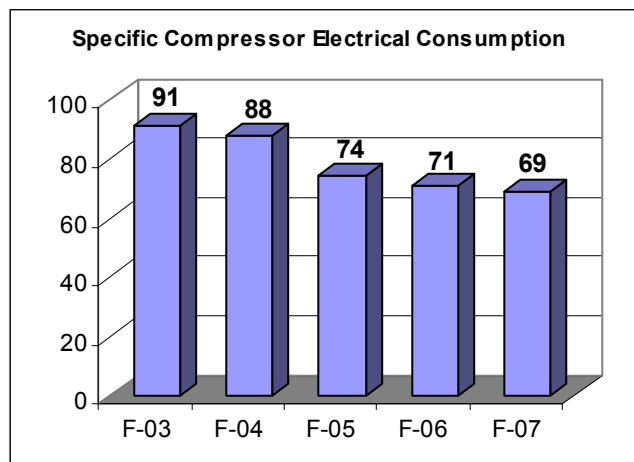
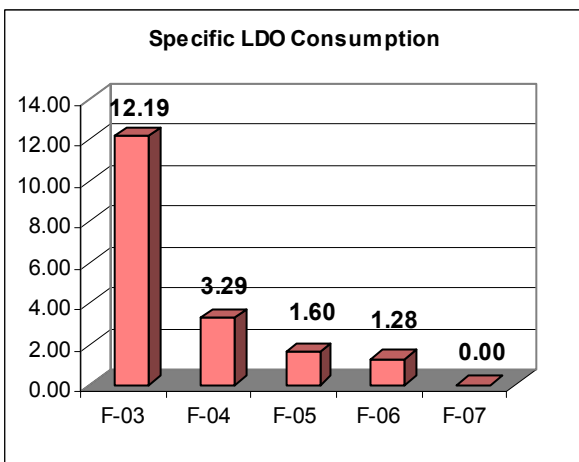
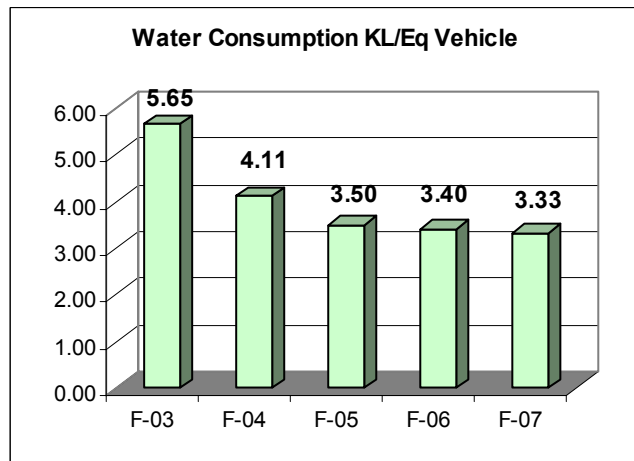
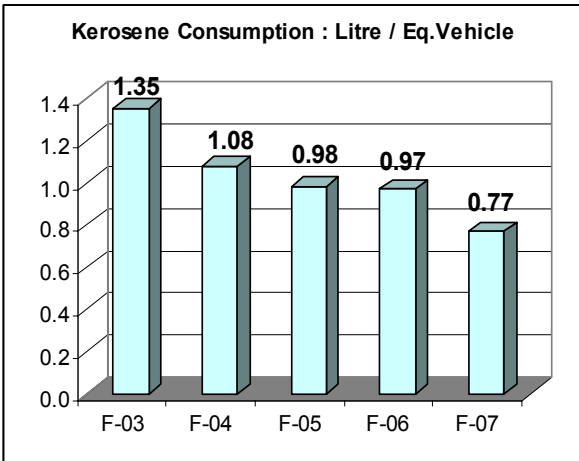
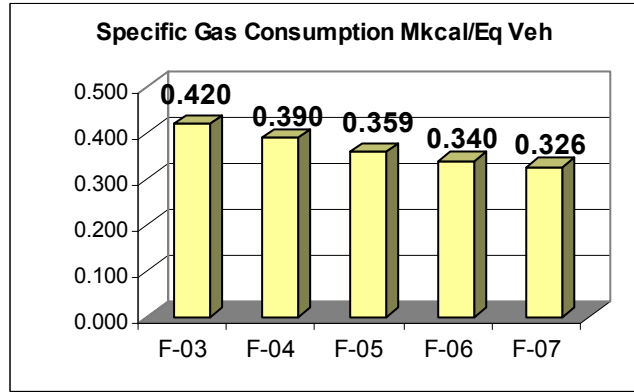
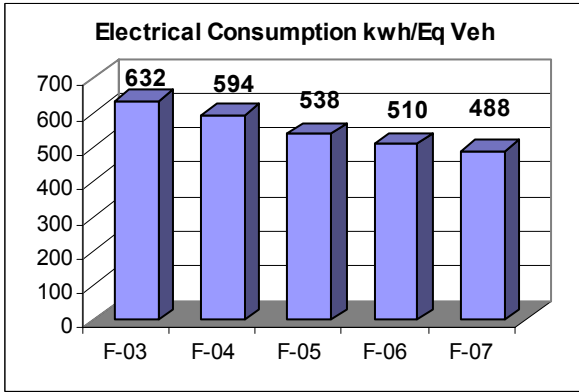
Leaflets and calendars containing Guidelines on Energy Saving has been distributed among all employees, Mahindra Colonies and Mahindra School children.

Company is having an Energy Conservation Cell which includes executives from all areas like production, maintenance, engineering. (**Cell structure enclosed**).

The executives of the company have attended Energy Conservation Seminars, exhibitions organized by BEE, IEM, Tata Power. The Energy Managers of the company have shared the best practices at different forums. Energy Management policy is well accepted by all the employees. The policy has been displayed in each section of the plant. (**Policy Attached**).

Energy Conservation awareness has been created among suppliers also.

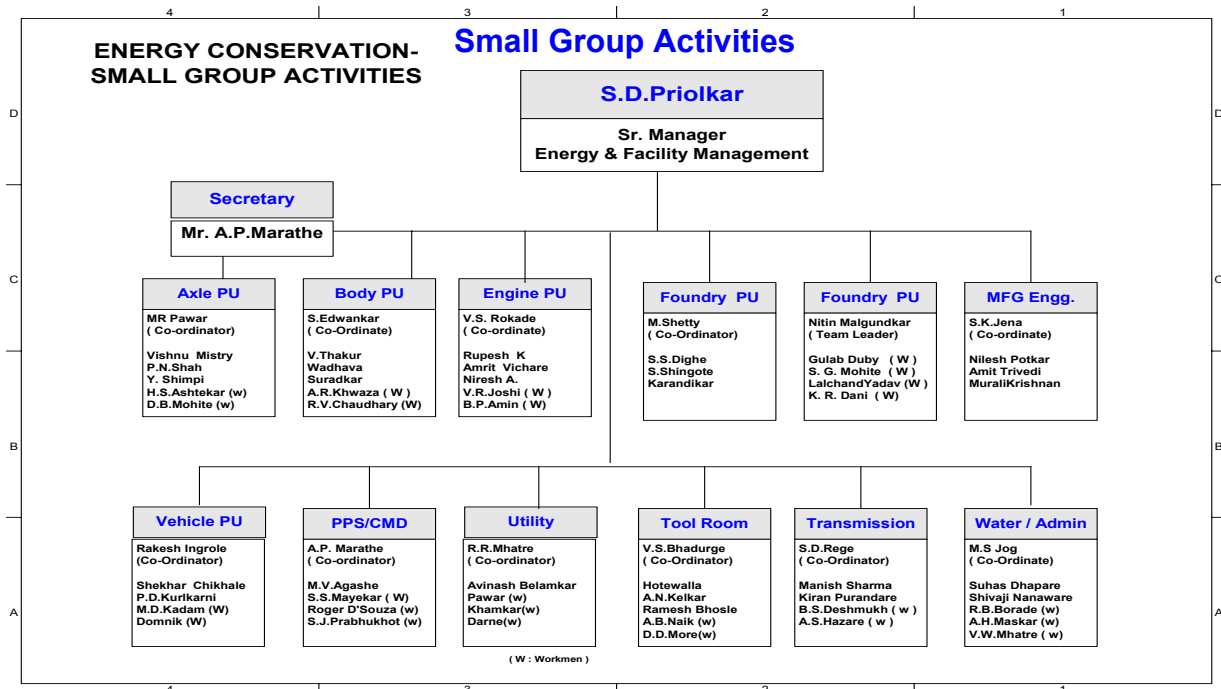
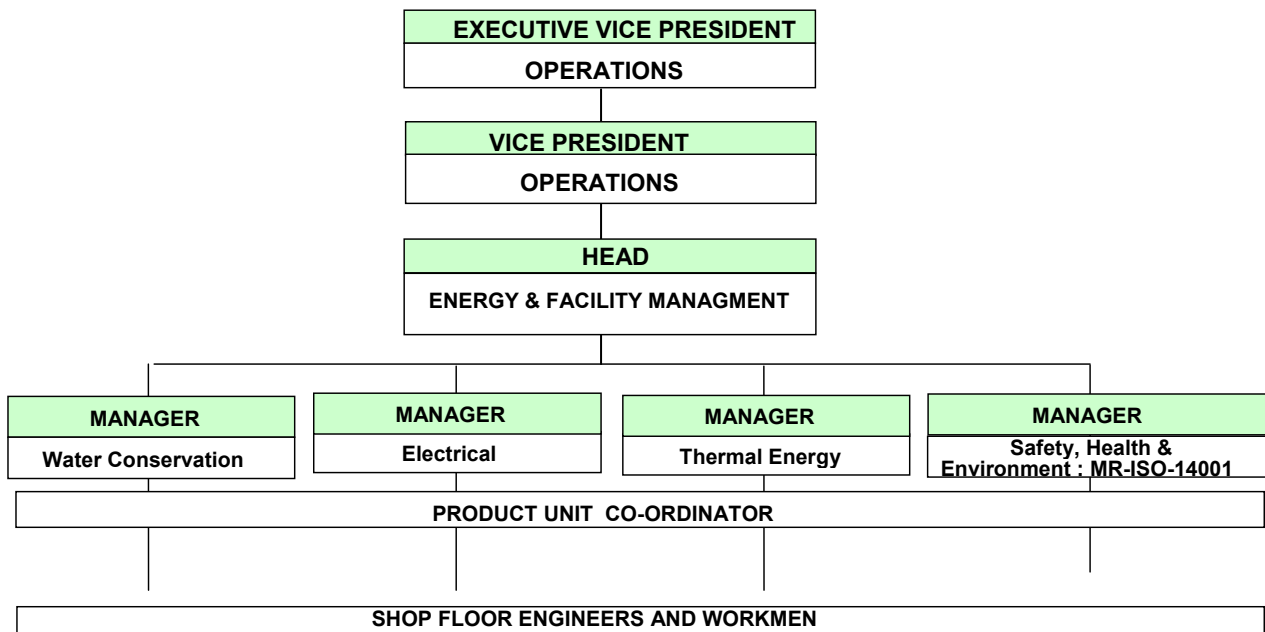
RESULTS



Energy management policy

- Create awareness & optimise specific energy consumption by adopting energy efficiency improvement, initiatives and conserve all sources of Energy.
- Bench mark specific energy consumption with National & International standards, and setting up systems to achieve them.
- Increase use of non-conventional sources of energy & alternate fuel sources.
- Conduct regular Energy Audits to reduce energy wastage in all areas.
- Work on environmental aspects and Clean development mechanism to reduce globe warming.
- Make an effort to reduce the cost continuously every year by adopting effective "Energy Management System".

ECON CELL STRUCTURE



Energy Conservation Achievements:

During the period between 2005-2007 Mahindra & Mahindra Ltd. has implemented around 350 proposals through Engineering initiatives, workmen's suggestion schemes, Auditors recommendations and TPM methodology resulting into total saving of Rs 706 lakhs with an investment of Rs 307 lakhs. This has resulted in a reduction of 9% in specific electrical energy consumption and 9% in specific thermal energy consumption.

a) Electrical Saving measures –

1. Installation of energy efficient screw compressor with spiral valve technology



Before-

1. Inefficient old reciprocating air compressor.
2. Electrical Consumption -14 Lacs kwh/annum
3. Total operating cost – Rs 81.20 lacs/annum

After -

1. Energy efficient screw compressor with spiral valve technology.
2. Electrical Consumption – 12. Lacs kwh/annum
3. Total operating cost – 71.15 lacs/annum

Saving – Rs. 10.05 Lacs/annum



2. Installation of energy efficient screw compressors for chiller at central air conditioning.



Before-

Inefficient Old reciprocating air compressors for central air conditioning at Admin building

Electrical Consumption: 3.88 Lacs kwh/ Annum

After –

Installation of Energy efficient screw compressors at central air conditioning.

Electrical Consumption : 2.80 Lacs kwh/ Annum

Savings

Cost - Rs. 5.40 Lacs/Annum



3. Replacing conventional hydraulic power packs with Energy efficient compact power packs



Before-

Conventional hydraulic power packs

Electrical Consumption: 32223 kwh/ Annum

After-

Energy efficient compact hydraulic power packs with zero leakage of oil.

Electrical consumption: 1223 kwh/annum

Saving – Rs. 1.55 Lacs/annum



4. Variable frequency drive for paint booth in Axle PU



Before-

Speed control with mechanical dampers

Electrical Consumption: 63800 kwh/ Annum

After-

Speed control of air blowers with VFD

Electrical consumption: 37800 kwh/annum

Saving – Rs. 1.30 Lacs/annum

B) Waste heat recovery projects

1. Heat Recovery : Use of waste heat to eliminate Electrical heaters at Continuous Gas



Before :

Conventional Electrical heaters at post wash

Operating Cost Rs. 11.69 Lacs /annum

After :

Waste heat recovery by installing heat exchanger at exhaust system of the furnace.

Operating Cost Rs. 2.04 Lacs /annum

Saving

Cost – Rs. 9.65 Lacs/annum



2. Super heat recovery from Air conditioning units.



Before :

Conventional electrical heaters at washing machine.(36 kw)

Energy Consumption 6.64 Lacs/annum

After :

Super heat recovery from air conditioning units to raise & maintain temp. of cleaning solution in washing machine.

Energy Consumption 1.64 Lacs/annum

Saving

Cost Rs. 5.00 lacs/annum



c) Thermal Savings

1. PNG instead of LPG for RX generator



Before

LPG for RX gas generator for cracking purpose.

Energy cost – Rs 30.60 Lacs/annum

After–

PNG instead of LPG for cracking for RX gas generator.

Energy cost – Rs. 22.60 Lacs/annum

Saving :

Cost : Rs 8.00 Lacs/annum

2. Insulation at recuperator s of CGC furnaces.



Before:

No insulation on recuperator body.

After:

Rock wool insulation provided for outer body of recuperator

Saving:

Cost : Rs. 2.16 Lacs /annum

d) Waste Management

1. Reuse of coolant oil.



**Before-
Coolant:**
80% water + 20% Oil
Cost of Coolant Disposal:
Rs.230/- per drum of 200 Ltrs

**After-
Coolant for disposal is treated and
80% water recovered, recycled and reused.
Mixing of treated waste water with sewage
and further treatment for land irrigation.**

e) Renewable Energy

1. Fanless natural draft cooling tower



Before :

Electric motor driven Fan type cooling tower.
Energy cost- Rs. 3.60 Lacs/annum

After :

Fanless natural draft cooling tower.
Energy cost- Nil

Saving :

Energy cost- Rs. 3.60 Lacs/annum

2. Turbine air ventilators instead of Roof extractors



Before :

Roof Extractor provided for ventilation purpose is normally operated by an electrical motor.

Electrical Consumption / Annum = 1.2 Lacs kWh

After :

Roof Extractors replaced by Turbine air ventilators which rotates on wind velocity.

Electrical Consumption : Nil

Saving Rs- 6 Lacs/annum

Other projects implemented during 2006-2007

- Automatic power factor controller for Foundry PU.
- Timer for solar system.
- Continuous to intermittent motors by modifying the circuits or using Programmable Logic Controls.
- Optimization of air-fuel ratio
- Stopping idle running of motors.
- Higher HP Motor to Lower HP Motor.
- Super heat recovery from AC unit to eliminate use of heaters in washing machine.
- Flat belts instead of ' V ' belts for blowers.
- Energy efficient UPS at IDAM & EDP .
- Insulation for recuperators.
- Air boosters for compressed air.
- Use of CFL instead of 60 w lamps.
- Providing temp. controller for cooling tower at utility.
- Installation of Energy alert system for air compressors.

Energy Conservation Plans and Targets:

Energy Conservation Measures (Planned)	Anticipated savings In Energy (Rs. lakhs)	Approx. Investment (Rs. Lakhs)	Project commencement & completion year
Energy efficient Screw compressor for air conditioning system at admin building	6.00	25.00	2008
Automation of water system & replacing underground lines with overhead.	10	8	2008
Waste heat recovery from compressor house to eliminate electrical heaters at vaporizers.	12	10	2008
Clean Development Mechanism	40.00	10.00	2008
Online filtration for water at pretreatment tanks.	20.00	15.00	2008
Piezo generator for power generation	4.00	10	2008
Replacing open type Burners by close type burners at SAC Furnace	2.85	4.5	2009
Engine testing cycle time reduction by providing preheated water & oil.	2.00	5.00	2009
VFD for TGPU & Foundry blowers	4.00	3.00	2009
Wind mill as non conventional energy source.	600	3700	2009

All other initiatives like Kaizens, Suggestions will continue and achieved saving to the tune of Rs. 260 Lacs. by the year 2009.

By adopting the above energy conservation measures, M & M will be able to achieve the set target of 459 KWH / Eq.vehicles & 0.313 MKCAL / Eq. Vehicle by the year 2009.

Environment & Safety :

The company's commitment and responsibility towards Safety, Occupational Health and Environment stems from its vision, which enjoys upon the company to sustain business growth with deep commitment to the environment.

Safety, Health and Environment is being continuously enhanced by its various initiatives on Safety Awareness including Safety Audit , Risk Analysis, Monitoring and Measurement, Health Check-ups of all employees..

Safety:

The Company has well established Safety, Occupational and Environmental Policy which inter alia ensures Safety of Public, employees, plant and Equipment. The Kandivli Plant comply with all statutory rules and regulations on regular basis, imparting training to its employees as per training calendar, carrying out statutory safety audits of its facilities as per legal requirement, conducting regular Medical check-up of its employees and promoting eco friendly activities. The plant has been certified for Occupational Health and Safety Management System ISO 14001:2004 and has also been certified for Occupational Health and Safety Management System (OHSAS 18001:1999).

Hazard identification and risk assessment is carried out in the plant, which has resulted to identify proactively the potential risk and methodology to control SH&E performance in an ongoing manner. Various measures has been taken to avoid the fire hazard like Installation of Gas leakage detectors, sprinkler system & fire hydrant system etc. in the plant.

Safety Week has been celebrated from 4th to 11th March. Competition on Safety Sloagn / Poster / Suggestion competition was conducted during safety week and winners are awarded. Interplant & inter department fire fighting competition organized in the plant & winners are rewarded.

Environment:

The company strives to enrich the environment wherever possible by various initiatives such as Greenbelt Development, Water & Waste Water Management, Solid Waste Management and Air Pollution Management. Following are the various management Program were carried out like

- Acoustic Insulation for Diesel Generators to reduce Noise Level.
- Reduction in pollution of Diesel operated forklift by replacing conventional P4 engine with Mahindra MDI 3200 engine. Pollution level of the forklift reduced from 95 HSU to 35 HSU.
- Use of CFC free refrigerant for air conditioning equipment's.
- Recycling STP water for gardening purpose.
- LPG forklift instead of Diesel forklifts..
- Reduction in scrap generation in Product Units.
- Extraction of cutting oil from metal chips and reusing it.
- Use of corrugated boxes in place of card board boxes for packing purpose and reusing the boxes

The company has installed Effluent Treatment Plant (ETP) and Sewerage Treatment Plant (STP) for waste water from Paint Shop and other means. It is monitored continuously as per Maharashtra Pollution Control Board (MPCB) norms. The plant has become member of **Mumbai Hazardous Waste Management** and disposes the hazardous waste as per the applicable norms. Environmental day is celebrated every year on 5th June.

The Kandivli Plant is working on Clean Development Mechanism for Carbon Emission Reductions by implementing various Energy Efficiency Projects. The projects have received Host Country Approval from Ministry of Environment, Govt. of Maharashtra.