

Unit Profile:

Mahindra & Mahindra Ltd, Automotive Sector is a part of 3 Billion US \$ conglomerate of Mahindra Group, which has a significant presence in the key areas of Indian Economy with the launch of new generation vehicles like Mahindra Bolero and the Mahindra Scorpio that sector has created global brands. Over the years, the Mahindra brand of vehicles have to come to represent high quality, ruggedness, durability, reliability, easy maintenance and operational economy. 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 global strategy today focuses on a mix of mergers and acquisitions and joint ventures to strengthen its core product areas, and enter new rich markets, both domestic and international.

The Automotive Sector Kandivli Plant has been awarded with QS-9000 certificate in the year 2000. The company has received TS-16949 certificate in the year 2003, being first company to receive the certificate. The plant has received TPM excellence award from JIPM (Japan Institute of Plant Maintenance) in the year 2003. The plant has been awarded with ISO-14001 and OHSAS-18001 certification for maintaining and implementing practices related with Safety, Health and Environment. CII Western region has awarded the Kandivli plant with HR excellence award in the year 2005 ' Commendation for significant achievement in HR excellence'

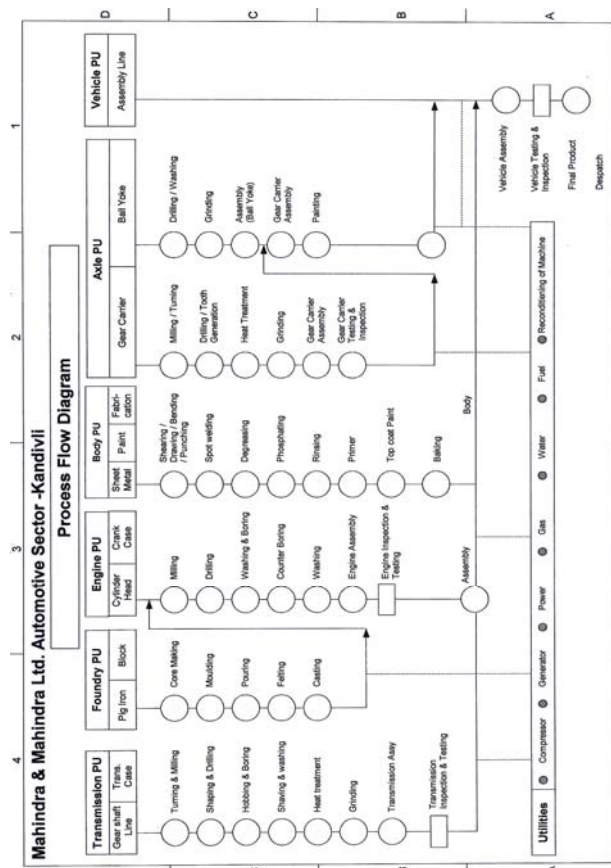
The Kandivli plant has received Special Prize in National Energy Conservation Award Competition, being first during three years in succession in 2003, 2004, 2005 from Ministry of Power, Govt of India. The plant has also received State Level Energy Conservation Award – First prize in Automobile and Engineering Sector in the year 2005.

The company has intensified its effort to identify niche markets for automotive products through out the world ,especially geographical areas that have similar sales, distribution & marketing condition as India. Over the years company's vehicles have been introduced in South Africa, Uruguay, UAE and Malaysia.

The company is more focused on Environmental aspects like Clean Development Mechanism (CDM) & Energy Efficiency improvement initiatives.

The Mahindra group has always been committed to corporate social responsibility. It has been built on five core values namely Good Corporate Citizenship, Professionalism, Customer first, Quality focus, and dignity of the individual. The company is spreading the message on Energy. conservation by designing new calendar on Energy conservation and distributed to children's in nearby school.

Various Small groups have been formed with senior executive as a facilitator to identify & implement the Energy Efficiency Projects.



Energy Consumption:

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

DESCRIPTION	UNIT	2003-2004	2004-2005	2005-2006
Annual Eq. Vehicle production	Nos.	52184	66589	64895
Total electrical energy consumption /annum	Lacs kWh	310	358	331
Specific energy consumption – Electrical	Units/Eq. Vehicle	594	538	510
Total Thermal(Fuel) Consumption/annum	MKCals	20592	23939	22043
Specific energy consumption – Thermal (Fuel)	MKCals /eq. Vehicles	0.390	0.359	0.340

YEAR	ELECTRICITY		THERMAL (FUEL)	
	Consumption (kWh / Eq. Vehicle)	% reduction over 2003 - 2004	Consumption (MKCals/ Eq. Vehicle)	% reduction over 2003 – 2004
2003-2004	594	-	0.390	-
2004-2005	538	9%	0.359	8%
2005-2006	510	14%	0.340	13%

Energy Conservation Commitment, Policy and Set Up

'Energy Saved is Energy Generated'. Mahindra Auto Sector, 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.

Senior Management actively participate in Energy Efficiency projects by providing budgetary support, motivating the employees for Ingenious thinking.

Energy Conservation week is celebrated every year during 14th December to 21st December.

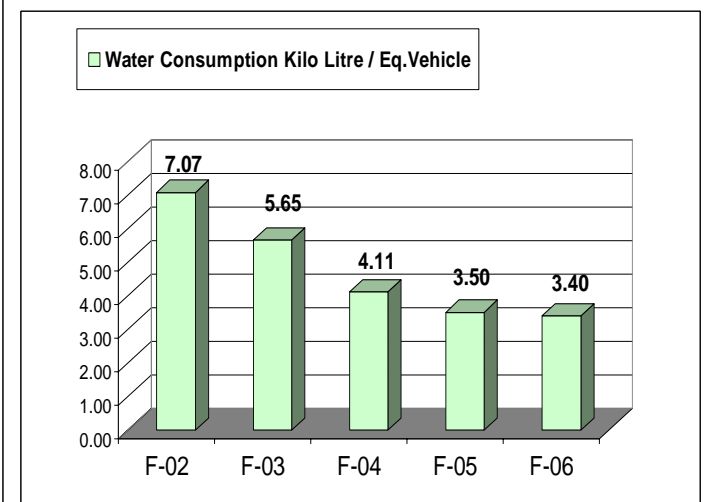
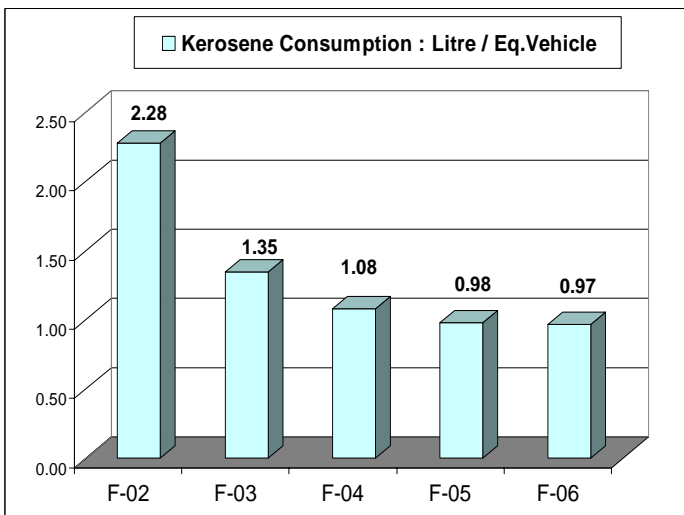
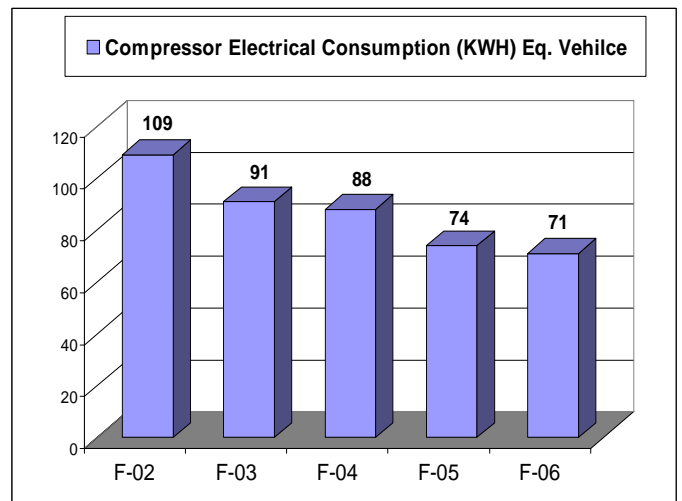
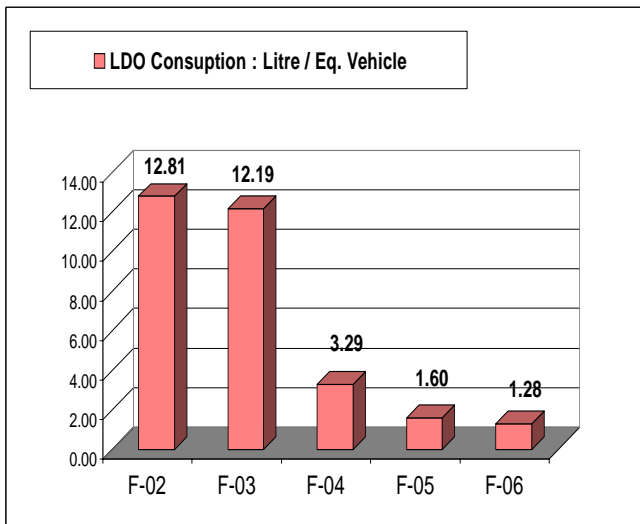
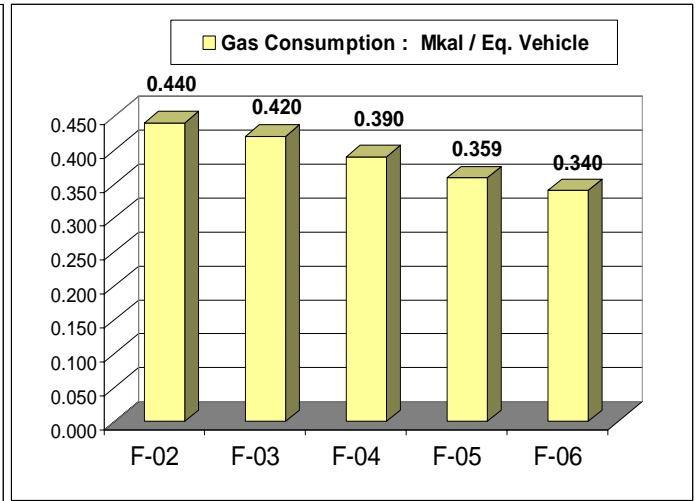
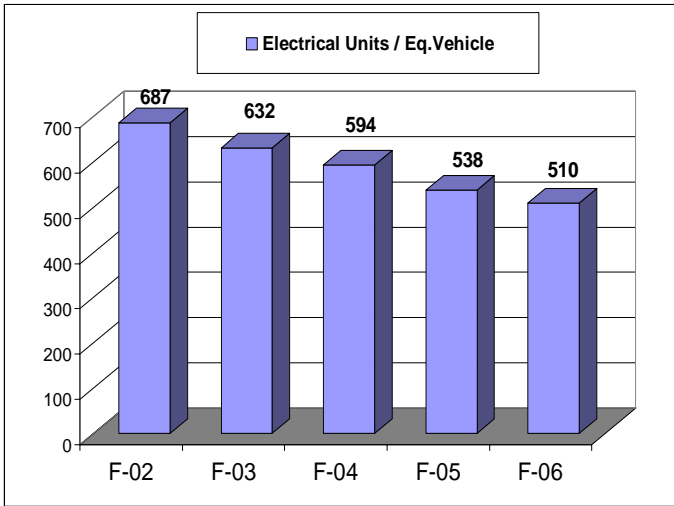
Energy Conservation Poster, Slogan and Suggestion Competition is conducted. The winners of the competition are awarded.

Under Social Corporate Responsibility, 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. Various small groups have been formed in the company which specifically work on Ingenious Projects. The group is led by Manager of respective section which includes workmen also.

The executives of the company have attended Energy Conservation Seminars, exhibitions organized by CII, PCRA, NPC. 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. Energy Conservation awareness has been created among vendors like M/S Amforge Industries, M/S Sona Koyo Steerings PVT.Ltd. etc.

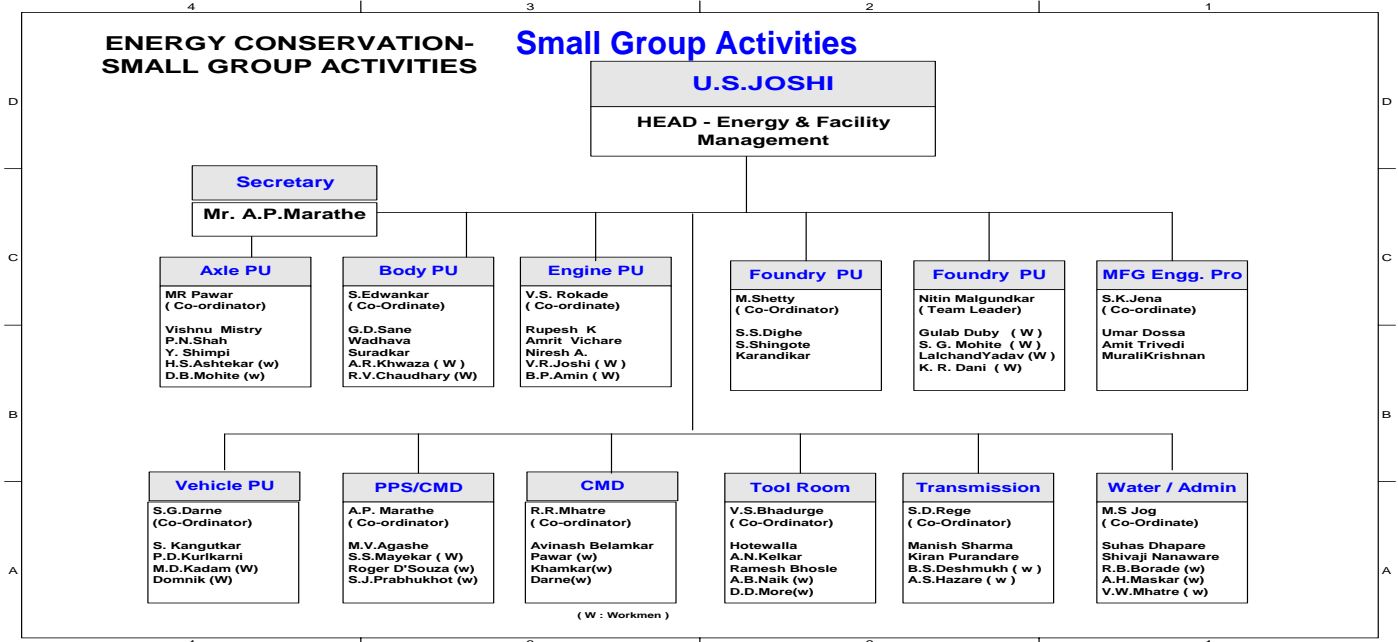
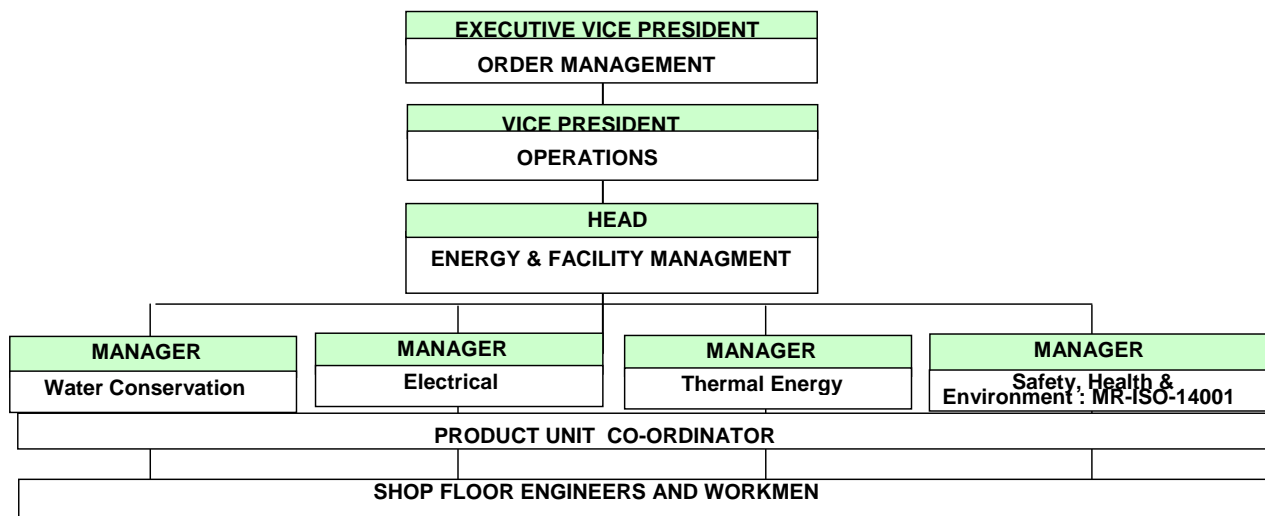
RESULTS



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 2004-2006 Mahindra & Mahindra Ltd. has implemented around 290 proposals through Engineering initiatives, workmen's suggestion schemes, Auditors recommendations and TPM methodology resulting into total saving of Rs 656 lakhs with an investment of Rs 203 lakhs. This has resulted in a reduction of 14% in specific electrical energy consumption and 13% in specific thermal energy consumption.

a) Electrical Saving measures (Compressors) –

1. Centralization of compressor house



Before-

1. Three different location of Compressor house
Viz. jeep compressor house, foundry comp. house & utility comp. house.
2. Electrical Consumption -45.88 Lacs kwh/annum
3. Total operating cost – 195 lacs/annum

After -

1. Centralised compressor house at utility
Optimum consumption of Compressors, Cooling tower, water pumps & air Dryers.
2. Electrical Consumption – 43 Lacs kwh/annum
3. Total operating cost – 182.76 lacs/annum

Saving – Rs. 12.24 Lacs/annum



2. Installation of energy efficient screw compressors with spiral valve technology



Before-

Inefficient Old reciprocating air compressors
Motor power – 400 kw (2100 CFM)
Electrical Consumption: 15.36 Lacs kwh/ Annum
Operating Cost = Rs. 65.28 Lacs / Annum

After –

Installation of Energy efficient screw compressors with spiral control valve technology.

Output modulation upto 40% as per compressed air demand.

Motor power- 300 kw (2179 cfm)

Electrical Consumption : 11.52 Lacs kwh/ Annum

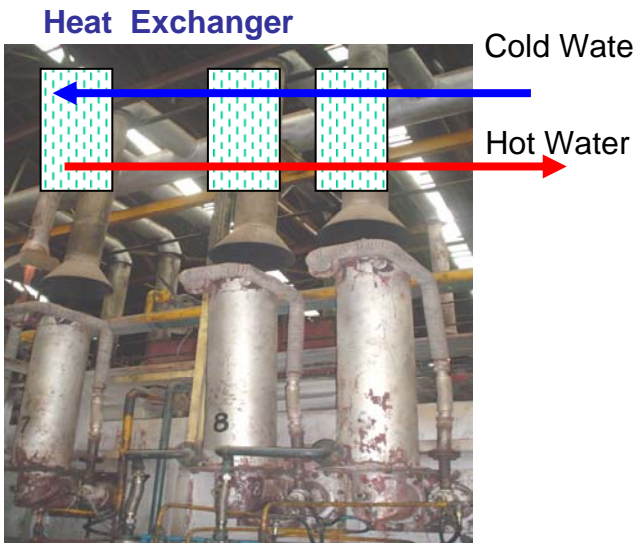
Operating Cost = Rs. 48.96 Lacs/Annum

Savings

Cost - Rs. 32.64 Lacs/Annum

B) Electrical savings measures-

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



Before :

Conventional Electrical heaters at post wash & air dryer.

Electrical Consumption :- 4 Lacs KWH / annum

Operating Cost Rs. 17 Lacs /annum

After :

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

Electrical Consumption :- 0.31 Lacs KWH / annum

Operating Cost Rs. 1.33 Lacs /annum

Saving

Electrical Consumption: 3.69 Lacs kwh/annum

Operating Cost – Rs. 15.67 Lacs/annum

2. Low voltage transformer for IDAM & AD building.



Before :

Existing Lighting Voltage – 250 Volts

Consumption -3.84 lacs kwh/annum

After :

Low voltage for Lighting : 217 Volts

Consumption -3.37 lacs kwh /annum

Saving

Electrical Consumption - 0.47 Lacs KWH / annum

Cost Rs. 2.00 lacs/annum

c) Thermal Savings

1. Revamping of Red primer oven in paint shop.



Before

Electrical consumption : 5.18 Lacs KWH /annum

Gas consumption : Rs 3.6 Lacs SCM Lacs /annum

After–

Revamping of Red primer oven with energy efficient blowers ,air handling unit & burners.

Electrical consumption: 3.35 Lacs KWH /annum

Gas consumption: 2.16 Lacs SCM /annum

Saving :

Electrical consumption: 1.83 Lacs KWH /annum

Gas consumption: 1.33 Lacs SCM /annum

Cost : Rs 21.14 Lacs/annum

E) Water Conservation

2.Improved insulation for Thermic fluid pipe lines in Paint Shop.



Before :
No insulation
For valves,flanges etc. for
thermic fluid pipe lines in paint shop

After :
Provided insulation for un-insulated
valves, flanges etc.

Saving
Cost : Rs. 1,49,000/-per annum

d) Waste Management

1. Reuse of scrap from press shop

Before



Process Scrap generated from
SC/Maxx. Dash Panel

After



Process Scrap utilized to make
Part no. 024601 Cover Bell
Housing Bottom

e) Renewable Energy

1.Solar water heating system to eliminate use of heaters in washing machine



Before :
Conventional Electrical Heating at washing machine.
High Electrical Consumption – 1.38 Lacs Kwh/ annum.

After :
Non conventional Solar Heating System.to eliminate use
of heaters for washing m/c.
Low Electrical consumption – 0.37 Lacs KWH / annum.

Saving :
Electrical Consumption– 1.01 Lacs KWH / annum
Cost Rs. 4.3 Lacs/ Annum



Before :

Roof Extractor provided for ventilation purpose is normally operated by an electrical motor.
 Electrical Consumption / Annum = 0.18 Lacs kWH

After :

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

Electrical .Consumption : Nil

Saving Rs- 0.75 Lacs/annum

Other projects implemented during 2005-2006

- Energy efficient air-conditioning system at Tool room & Metrology.
- Seven day timer for washing machines.
- 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.
- Use direct heating avoiding indirect heating.
- Effective Insulation for post wash at CGC-2.
- Air pressure regulators & blow gun.

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	2007
Vapour Absorption System for air conditioning in Transmission PU.	4.20	21.00	2007
Install waste heat recovery for CGC 1 furnace and preheat quench oil	12	8	2007
Fanless cooling tower instead of electrical fan driven	10	6	2007
Replacing open type Burners by close type burners at SAC Furnace	2.85	4.5	2007
SCADA System for electrical distribution network	2.00	5.00	2007
Clean Development Mechanism	40.00	10.00	2007
Fuel Cells for Power & Heat generation	104	650	2008

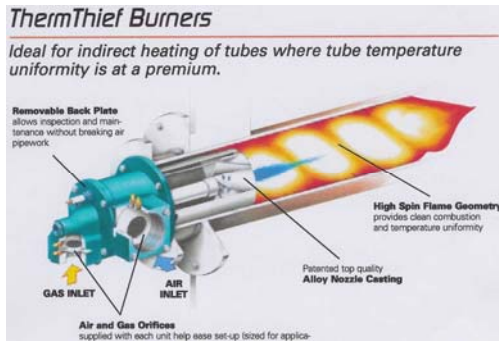
Wind mill as non conventional energy source.	600	3700	2009
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All other initiatives like Kaizens, Suggestions will continue and achieved saving to the tune of Rs. 260 Lacs. by the year 2008.

By adopting the above energy conservation measures, M & M will be able to achieve the set target of 460 KWH / Eq.vehicles & 0.31 MKCAL / Eq. Vehicle by the year 2008.

Future Project

1.To reduce the thermal consumption by replacing open type to close type burner at SAC Furnace- Heat Treatment



Before :

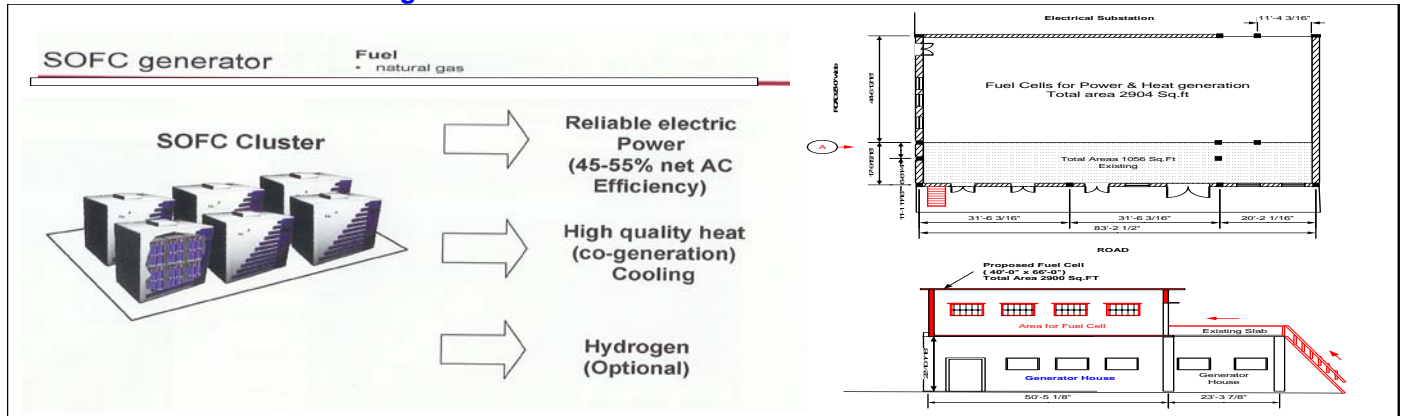
Open type burner
No pre Heating of Air
Flue gases exhausted to atmosphere.

After :

Close Type Burner
Preheating of air with Recuperator(waste heat recovery from flue gas)
Multi tube design deliver fuel saving upto 30%
High spin Flame Geometry provide clean combustion and temp. uniformity

Savings per Annum - Rs.2.85 Lacs / Year

2. Fuel Cells for Power & Heat generation



3. Unitized substation with dry type transformer



Before –Oil type transformer



After :Unitize substation with dry type transformer

BENEFIT :Maintenance free
No oil Leakage
No Gas formation
Compact Design- Space Saving

Environment & Safety :

Mahindra & Mahindra ,Automotive sector ,Kandivli plant has well established Safety,Occupational ,Health and Environmental policy to ensure optimum safety of the employees,public,plant & equipment, which are embedded in the core organizational values of the company.

Company's commitment towards 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:

Audits were conducted in line with our SOH&E Policy to maintain the optimization of resources elimination / minimization of OHS Hazard, at the first place and to bring better control by adopting the best operational practices and to sustain the zero accidents at Kandivli Plant.

Audiometry tests are carried out periodically and management programs are implemented in various product units for minimization of environmental aspects and OHS Hazard with the help of structural reviews to steer our ongoing performance. Special type of personal protective equipment's have been introduced for the betterment of Occupational hazard. Medical advise in terms of medication, diet recommendations and regular exercise is rendered at Occupational Health Center for all the employees through training programs and display boards at canteen.**Mahindra & Mahindra ,Auto sector,Kandivli plant has been certified for Occupational Health and safety management system(OHSAS 18001) certification which aim's at minimize risk to employee & other parties associated with the activity of the company.** 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 Sloagn / Poster / Suggestion competition was conducted during safety week celebration from 4th March to 11th March.

Environment:

External environment audits through certifying agencies were conducted and various environmental Initiatives including environmental monitoring were implemented to maintain the ecological balance in and around the company premises.The requirements relating to various environmental legislations and environment protection were duly complied by the company. Environment Management Program were carried out like

- 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 Press Shop.
- 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
- On line data system implemented for compliance of statutory obligations under the hazardous waste (M&H) Rules 2003.
- Exploring the possibility of availing CDM benefits.

Conducted plant wide audits for Safety, Health & Environment to evaluate the performance and to maintain the health competition amongst each plant as a result the award was granted to the plant who has implemented SH&E activities through Mahindra Manufacturing Excellence Award – SH&E.

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.Company has also certified with new amended standard of ISI 14001:2004.

Trend setter

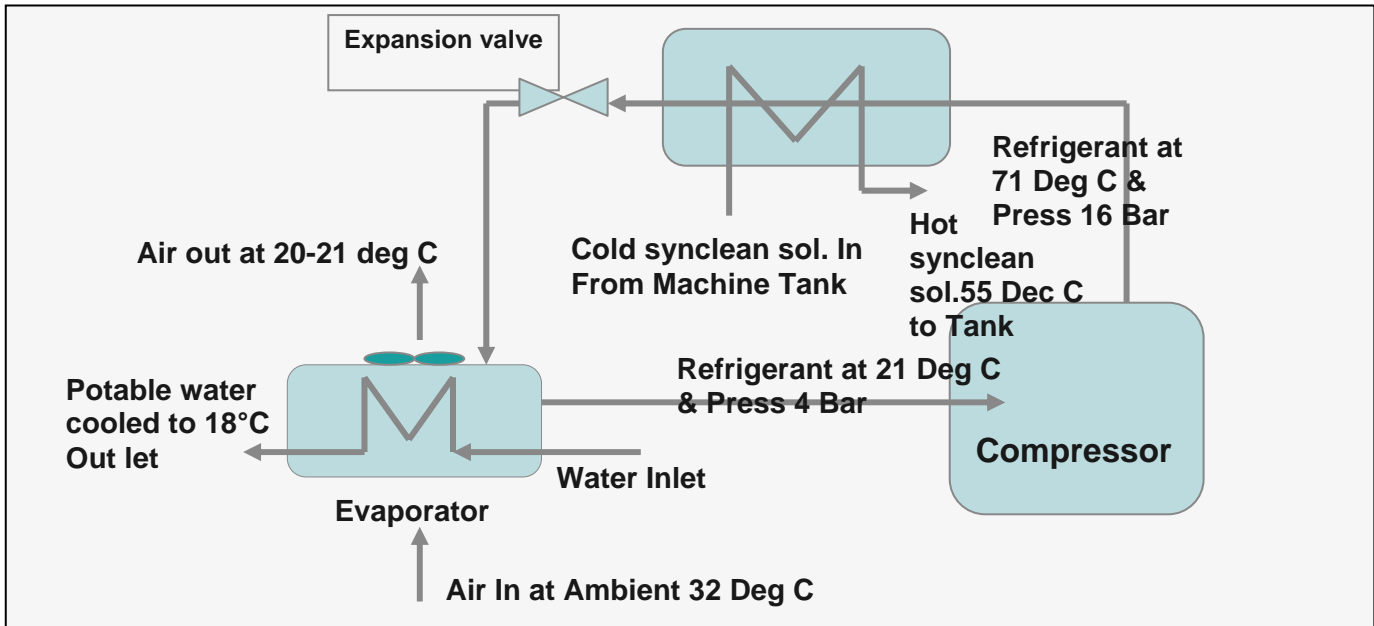
Installation of Sullair make screw air compressor with spiral valve technology

Trend setter

Heat pump instead of electrical heaters.

Heat Pump is innovative solution to minimize the energy loss which work on basic vapor compression cycle from Thermodynamics. It is unique solution to rise the temp. of synclean solution upto 55 Deg.c therby eliminating use of electrical heaters in washing machine.(worked with IIT Mumbai)

Working principle-



The heat pump is a closed loop system which works on the principle of thermodynamics vapor compression cycle. In this cycle, the circulating substance is physically separated from the source and user stream, and is re-used in a cyclical fashion.



Advantage-

Heat pump is three in one technological development. The main features of Heat pump includes-

1. Eliminating use of electrical heaters by heat pump.
2. Provide cold water at 18 Deg.c therby eliminating use of water cooler.
3. Atmospheric cooling of 5 Ton therby reducing requirement of air conditioning.

Heat pump can be for heating ,air conditioning ,heat recovery application in industries.