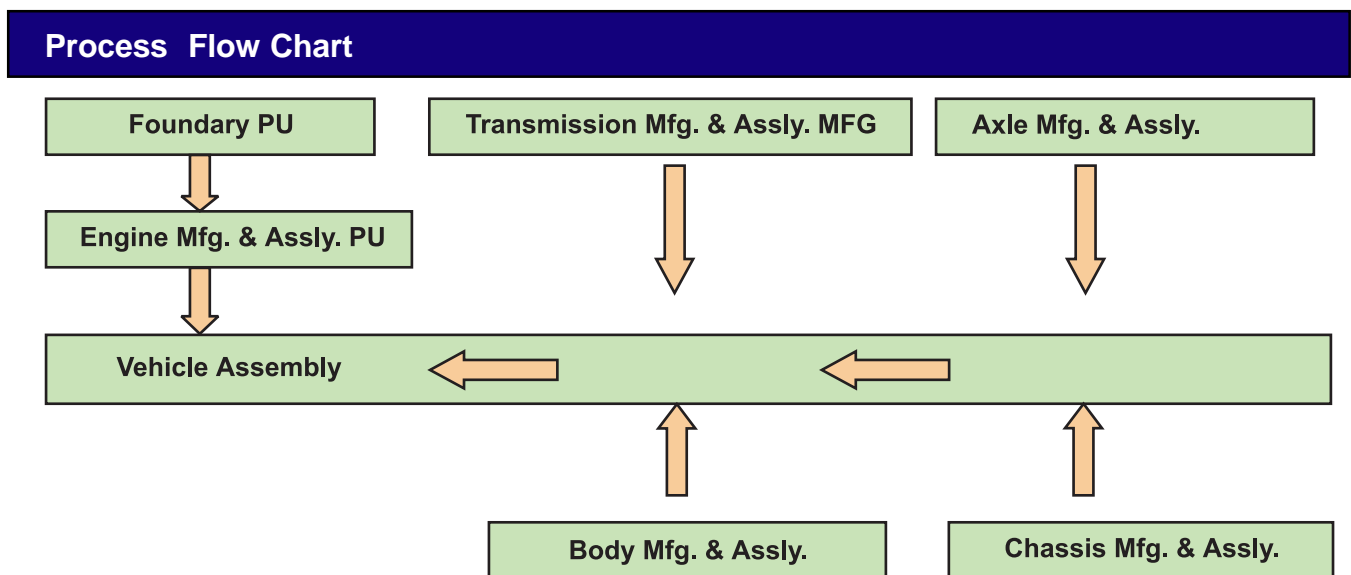


MAHINDRA & MAHINDRA LIMITED
Kandivli (East), Mumbai (Maharashtra)

Unit Profile

Mahindra & Mahindra Limited, Automotive Sector is a major player in the automotive industry in India. It is a part of Rs. 8000 Crores Mahindra group which manufactures Multi Utility Vehicles (MUVs- further classified into soft tops, hard tops and pick-ups), Light Commercial Vehicles (LCVs) and three wheelers. 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 four manufacturing plants three in the state of Maharashtra located at Kandivli, Igatpuri & Nashik and fourth in Andhra Pradesh located at Zaheerabad. The sector is in the process of commissioning its plant at Haridwar in Uttaranchal.

Having conquered a substantial portion of India's semi-urban and rural markets, the division has in recent years secured significant success in urban regions following the introduction of premium MUVs like Bolero, and Scorpio. Scorpio is M&M's first indigenously developed Sports Utility Vehicle - an off road vehicle with car like comforts. The Scorpio was launched in June, 2002 and has been universally acclaimed. It was declared to be the "Car of the Year" by CNBC Autocar, BBC Wheels and Business Standard Motoring in the year 2003. The company has entered into various new export markets including South Africa, Uruguay, UAE and Malaysia. In this global competitive market Mahindra has sustained because of more customer focus and Energy Management for reducing the operational & energy cost. Various Small groups has been formed with senior executive as a facilitator to identify & implement the Energy conservation projects.



Energy Consumption

By implementing various energy conservation projects there has been a consistent decrease in the specific Electrical and Thermal Energy Consumption.

DESCRIPTION	UNIT	2002-2003	2003-2004	2004-2005
Annual Eq. Vehicle production	Nos.	42508	52184	66589
Total electrical energy consumption /annum	Lakhs kWh	269	310	358
Specific energy consumption – Electrical	Units/Eq. Vehicle	632	594	538
Total Thermal(Fuel) Consumption/annum	MKCals	17774	20592	23939
Specific energy consumption – Thermal (Fuel)	MKCals / eq. Vehicles	0.420	0.390	0.359

YEAR	ELECTRICITY		THERMAL (FUEL)	
	Consumption (kWh / Eq. Vehicle)	% reduction over 2002 -03	Consumption (MKCals/ Eq. Vehicle)	% reduction over 2002 – 03
2002-2003	632	-	0.420	-
2003-2004	594	7%	0.390	7%
2004-2005	538	15%	0.359	14%

Energy Conservation Commitment, Policy and Set Up

Mahindra & Mahindra Ltd, Auto Sector Kandivli plant, considers Energy Saving as a multi disciplinary approach. Even the smallest cost reduction is going to add directly to its profits in bottom line. Plant energy profile consist of Electricity, Gas, Oil, Light Diesel Oil, High Speed Diesel Oil, Kerosene and Water. Budget provisions are made exclusively for Energy conservation management. (ECON) Energy conservation plans, policy and structure are reviewed periodically. Plant has conducted In house seminar on 'Energy Conservation' with external faculties like National Productivity Council, Atlas Copco, Enercon, Croma Engg and Thermax which was attended by participants from all plants of Auto Sector. Senior executives have attended 'Energy Conservation Meet' organized by CII and visited Reliance Industries, Godrej, ICICI Towers to share energy conservation ideas. Energy Conservation week is celebrated every year from 14th December to 21st December. Poster and slogan competition on Energy saving was conducted in every year.

Energy Management policy is displayed every where in the plant for creating the energy conservation awareness. The company has formed cross functional teams for cost reduction through Energy savings. Each team comprises of Senior Executives as facilitators with members from each product units. Safety

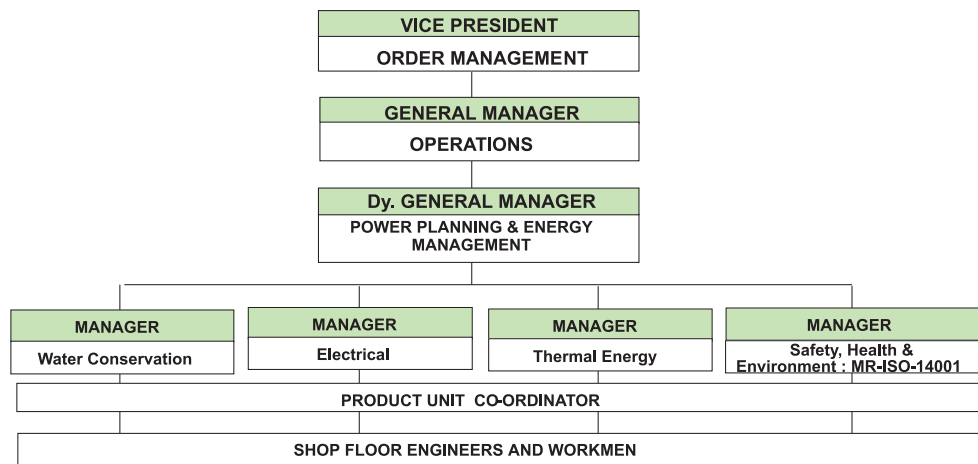
and Environment Department is also closely attached with Energy Conservation Cell. Top management like president, vice- president, General managers actively participate in the energy conservation program and support the energy conservation plans by providing the necessary budgetary and morale help.

The importance of energy conservation was emphasized through various forums and TPM (Total Productive Maintenance) methodology. By using TPM methodology plant has implemented more than 200 kaizens (small improvements) like: - Removal of unwanted motors, Continuous to intermittent operating of motors, Timer for Blowers / Heaters, Providing air pressure regulators, Stopping idle running of motors, Photo cell control for lighting, Combining activities etc.

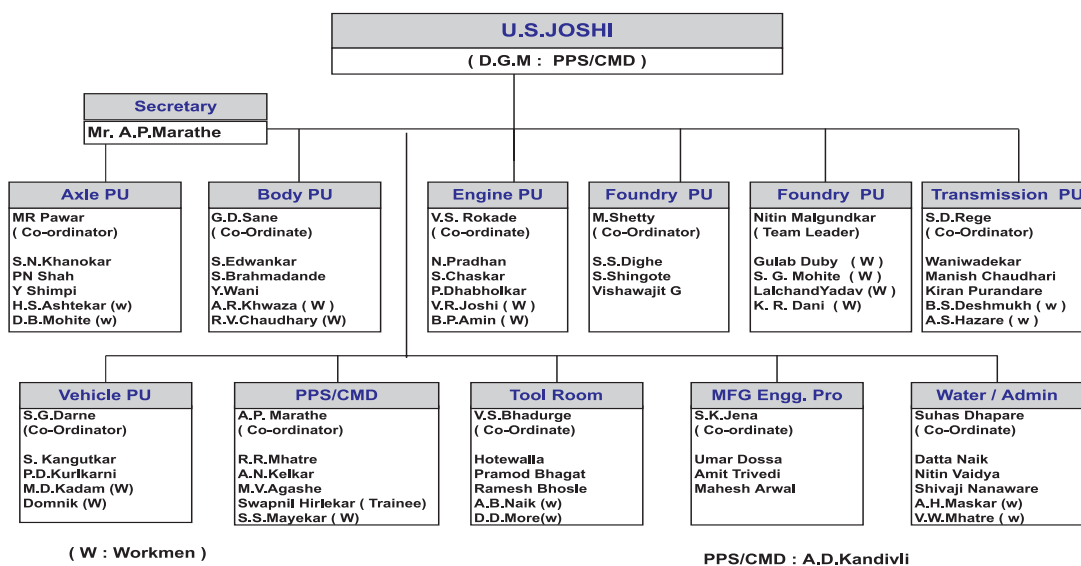
Energy Management Policy

- Promote Energy saving and conservation of resources.
- 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.
- Comply with the Energy Legislation and other regulations.
- Conduct regular Energy Audits to reduce energy wastage in all areas.
- Promote awareness among all employees through leaflets, seminars, competitions and company visits.
- Recognise energy conservation initiatives taken by employees and award them.
- Reduce waste generation and promote disposal, reuse and recycling in an Environment friendly manner.
- Make an effort to reduce the cost continuously every year by adopting effective “Energy Management System”.

ECON CELL STRUCTURE



SMALL GROUP ACTIVITIES



Energy Conservation Achievements

During the period between 2003-2005 Mahindra & Mahindra Ltd. has implemented around 320 proposals through Engineering initiatives, workmen's suggestion schemes, Auditors recommendations and TPM methodology resulting into total saving of Rs 589 lakhs with an investment of Rs 143 lakhs. This has resulted in a reduction of 15% in specific electrical energy consumption and 14% in specific thermal energy consumption.

a) Electrical Saving – (Compressed Air)

1. Screw Compressor with Variable Frequency Drive



Before Installation :

For 2200 cfm output compressed air requirement, plant was running four compressors having total motor capacity of 630 hp.

Motor Capacity	= 630 hp
Power Consumption per Annum	= 25.32 Lakhs kWh
Operating Cost	= Rs. 107.63 Lakhs / Annum

After Installation:-

Screw compressor with VFD running in combination with existing compressors having total motor capacity of 516 hp .

Motor Capacity	= 516 HP
Power consumption per annum	= 20.79 Lakhs kWh
Operating Cost	= Rs 88.35 Lakhs / Annum

Saving = Rs. 19.20 Lakhs / Annum

2 . Provided Pressure regulator to supply 75 psi air pressure instead of 95 psi.



Before :

Used of High Air pressure of 95 psi for engine testing for Nut runner and cleaning purposed

After :

Provided low pressure air of 75 psi instead of 95 psi by providing air pressure regulator.

Saving in Units = 9596 units / annum

Saving in Rs = 0.41 Lakhs / annum

3. Use of air booster to increase the air pressure for Makino Machine.



Installed Air Booster at Makino Machine in Transmission PU

Before = Supply of Air Pressure - 100 psi

Electrical Consumption = 8964 units/ annum

After = Supply of Air Pressure - 75 psi

and increased upto 100 psi by Air Booster only near the m/c

Saving in Electrical consumption = 1,792 units / annum

Saving in Rs = 7,616 per annum (For two Makino machines)

b) Electrical Savings Measures :

1. Integrated (IT) gun in place of Conventional gun for Spot Welding.



Before - Use of conventional spot welding m/c gun

Power Rating :- 150 KVA

Electrical Consumption :- 0.72 Lakhs / annum

After- Use of Integrated gun (IT Gun)

Power Rating :- 33 KVA

Electrical Consumption :- 0.16 Lakhs / annum



Installed 6 nos of IT Guns.

Total Saving :- 3.37 Lakhs KWH / annum

Rs. 14.32 Lakhs / annum

2. Installed Steffa Control valve for Optimum utilization of Chilled water in Central AC Plant



Installed Steffa Control Valve for optimum utilization of chilled water at Central Air Conditioning Plant.

Saving :- 3579 KWH / annum
Rs. 0.15 Lakhs / annum

3. Conversion of Core baking over from Electrical to PNG in Foundry



Foundry Core Baking Oven which was running on Electrical firing converted to PNG firing by installing fuel efficient burners.

Before :- Electrical Heating

Electrical Consumption – 3.45 Lakhs KWH / annum
Cost :- Rs. 14.69 Lakhs / annum

After :- PNG Heating

Thermal Consumption – 1.06 Lakhs SCM / annum
Cost :- Rs. 9.09 Lakhs / annum

Saving :- Rs. 5.60 Lakhs / annum

c) Thermal saving & Heat Recovery

1. Conversion of Thermopac from LDO to PNG with Heat Recovery



Before :- Thermopac used for heating of Thermic Fluid Previously was running on LDO.

LDO Consumption – 415 Lts / day
Cost of LDO – Rs. 25.17 Lakhs / annum

After :- Thermopac used for heating of Thermic fluid Converted to PNG firing with Heat Recovery System.

PNG Consumption – 798 SCM / day
Cost of PNG – Rs. 20.50 Lakhs / annum

Saving :- Rs. 4.67 Lakhs / annum

2. Heat pump using atmospheric heat for washing machines



Before - Use of 66 kw electrical heaters for water heating in washing machine.

After – Heat Pump using atmospheric heat to rise the temperature of water from 32 ° to 60 ° for washing machine avoiding electrical heaters.

Saving = 1.77 Lakhs KWH / annum

= Rs. 7.51 Lakhs / annum

3. Reduction in diesel consumption by Supplying Preheated water for Engine.



Reduction in diesel consumption during Engine testing by Supplying of Preheated water thereby reducing cycle time.

Before : Engine testing cycle time 25 Mins

Diesel Consumption / engine :- 3.5 Ltrs

After : Engine testing cycle time 15 Mins

Diesel Consumption / engine :- 2.2 Ltrs.

Saving : 1. 3 Ltrs / engine

: Rs 21.63 Lakhs /annum

d) Process Change

1. Induction heating with press quenching of NGT synchro sleeve eliminating gas Fired muffle furnace.



Before - Heating of NGT synchro sleeve at gas fired muffle furnace & quenching at dunking tank in Heat Treatment Transmission PU.

Operating Cost :- Rs. 8.76 Lakhs / annum (Cost of PNG,quenching oil)

After-Induction heating & press quenching of NGT synchro sleeve at induction quench press 7059 instead of gas fired muffle furnace.

Operating Cost :- Rs. 2.23 Lakhs / annum

(Cost of Electricity & polymer)

Saving - RS 6.54 Lakhs/ annum

Renewable Energy

1. Turbine Air Ventilation System



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

Replaced by Turbine air ventilator which rotates on wind velocity.

Before Installation :

Roof Extractor: Electrical Consumption / Annum = 0.11 Lakhs kWh

After Installation:-

Turbine Air Ventilator : Electrical Consumption : Nil

Investment : 0.18 Lakhs (2 Nos.)

Saving = Rs. 0.44 Lakhs / Annum

2. Solar Photovoltaic Street Light installed as non conventional energy source at Kandivli Plant.



Solar Photovoltaic Street Light installed as non conventional energy source at Kandivli Plant. The system consists of Photovoltaic cell with Inverter and battery set.

Installed 2 nos of 22 watts Solar Street Lights.

Saving : Rs. 673 / annum.

Other projects implemented during 2004-2005

- Variable frequency drive for Body top coat Exhaust blower in paint shop.
- Automatic power factor controllers.
- Continuous to intermittent motors by modifying the circuits or using Programmable Logic Controls.
- Online Diesel dispenser system
- Stopping idle running of motors.
- Higher HP Motor to Lower HP Motor.
- Automatic Star Delta Converter.
- Flat belts instead of ' V ' belts for blowers.
- Boosters for High Pressure Compressed Air in machine shop.
- Use direct heating avoiding indirect heating.
- Effective Insulation for Paint Shop Ovens.
- Air pressure regulators.
- Recycling & Reuse of Waste Material.
- Turbine Air Ventilation System.
- Building Management system for effective air conditioning.

Energy Conservation Plans and Targets

Energy Conservation Measures (Planned)	Anticipated savings In Energy (Rs. lakhs)	Approx. Investment (Rs. lakhs)	Project commencement & completion year
Centralization of compressor house at utility compressor house	25.00	75.00	2006
Fuel Cells for Power & Heat generation	104	650	2006
Install waste heat recovery for CGC 2 furnace and preheat quench oil	7.72	10.00	2006
Replacing open type Burners by close type burners at SAC Furnace	2.85	4.5	2006
Heat pump for washing machine	8.00	15.00	2007
Vapour Absorption System for air conditioning in Transmission PU.	4.20	21.00	2007
Variable Frequency Drives for Gray Primer Booth Exhaust Blowers in Paint Shop.	10.00	6.28	2007
Solar Water heating system for washing machine	10.00	17.50	2007

All other initiatives like Kaizens, Suggestions will continue and achieved saving to the tune of Rs. 260 Lakhs. by the year 2007

By adopting the above energy conservation measures, M & M will be able to achieve the set target of 484 KWH / Eq.vehicles & 0.32 MKCAL / Eq. Vehicle by the year 2007.

Environment & Safety

Various initiatives on Safety Awareness including Safety Audit, Risk Analysis, Monitoring and Measurement, Health Check-ups of all employees. Safety, Occupational, Health and Environmental Policy is revised and released.

Safety

Audits were conducted in line with our SH&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. **For enhancing the Health & Safety Performance we have adopted OHSMS i.e. OHSAS 18001**

alongwith EMS ISO 14001:2004 for ensuring the good safety, health and environment management standard. 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.