



# Mahindra & Mahindra Ltd.

**Mahindra**

**Automotive Sector , Kandivli, ( Mumbai )**

## Unit Profile:

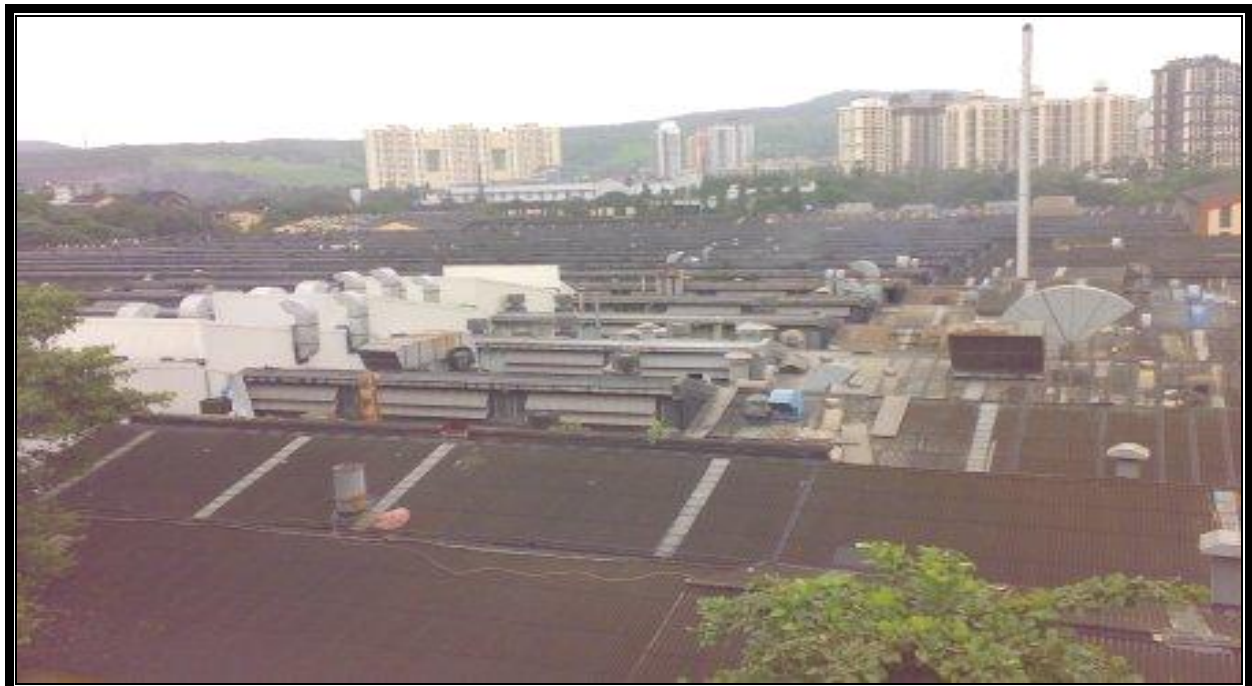
The US \$ 6.7 billion Mahindra Group is among the top 10 industrial houses in India. Mahindra is market leader in multi utility vehicles in India. It made a milestone entry into the passenger car segment with the Logan.

The group has a leading presence in key sectors of the Indian Economy including financial services, trade, retail and logistics, automotive components, after market, information technology and infrastructure development. Mahindra is now poised to make an entry in two wheeler segment.

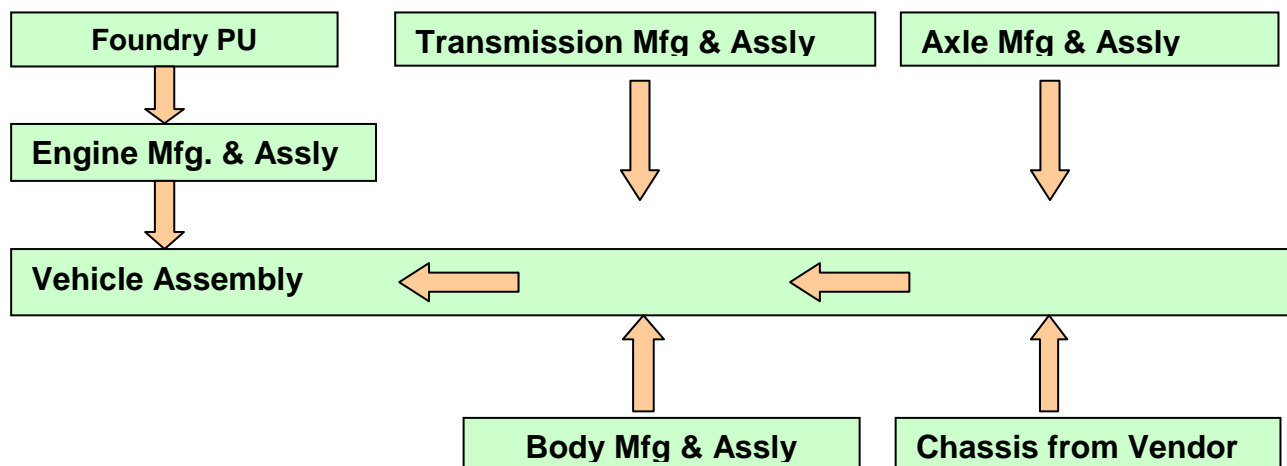
The Automotive Sector has five manufacturing plants, three in the state of Maharashtra located at Kandivli, Igatpuri & Nashik, fourth in Andhra Pradesh located at Zaheerabad and fifth at Haridwar in Uttaranchal state. The sector has started a green field project at Chakan near Pune. The sector's strategy focuses to surpass customer's latent desires by unleashing the passion of the people.

The Automotive Sector Kandivli Unit is engaged in the manufacturer of axle, transmission, castings, engines and vehicles like pickup, utility and bolero. The unit has been received TS-16949, TPM excellence award from JIPM (Japan Institute of Plant Maintenance) ,Golden Peacock award in corporate governance 2006, ISO-14001 and OHSAS-18001:2007 certification for maintaining and implementing practices related with Quality, Safety, Health and Environment.

In order to have a competitive edge on product, the unit has continuously improved, modernize and enhance the quality of the product through innovative technology like Vacuum Furnace, Induction Furnace and CNC machines. Corporate Social Responsibility ( CSR ) has always been an integral part of plant and has been the cornerstone of its core value of Good Corporate Citizenship. CSR activities of the unit includes medical camp for senior citizens, educational guidance to school children, Shramdan , tree plantation etc



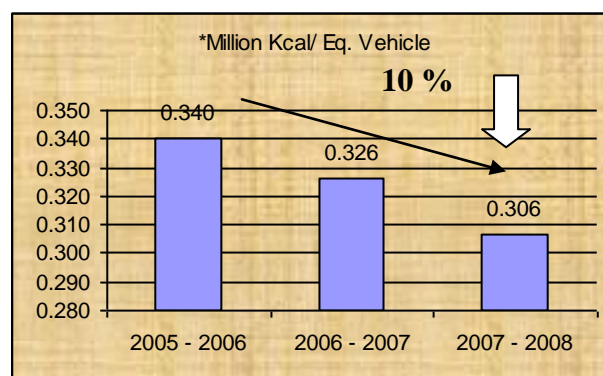
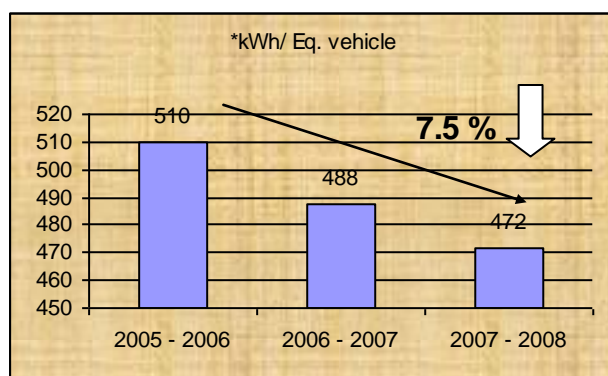
## Process Flow Chart



## Energy consumption

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

DESCRIPTION	UNIT	2006-2007	2006-2007	2007-2008
Annual Eq. Vehicle production	Nos.	64895	67749	85820
Total electrical energy consumption /annum	Lacs kWh	331	330	405
Specific energy consumption – Electrical	Units/Eq. Vehicle	510	488	472
Total Thermal(Fuel) Consumption/annum	MKCals	22043	22114	26284
Specific energy consumption – Thermal (Fuel)	MKCals /eq. Vehicles	0.340	0.326	0.306



## Energy conservation commitment, policy & set up

Mahindra & Mahindra Ltd, Auto Sector Kandivli plant ,achieves Energy Saving by conserving various energy sources like Electricity, Gas, Oil, Light Diesel Oil , High Speed Diesel Oil , Kerosene and Water through the interaction of various departments.

Company has well formed Energy conservation cell which constitute the members from Production, maintenance as well as utilities & works on energy conservation under the guidance of the Vice President - Operations. Each team comprises of Senior Executives as facilitators with members from all sections including workmen.

### **Function of EC cell-**

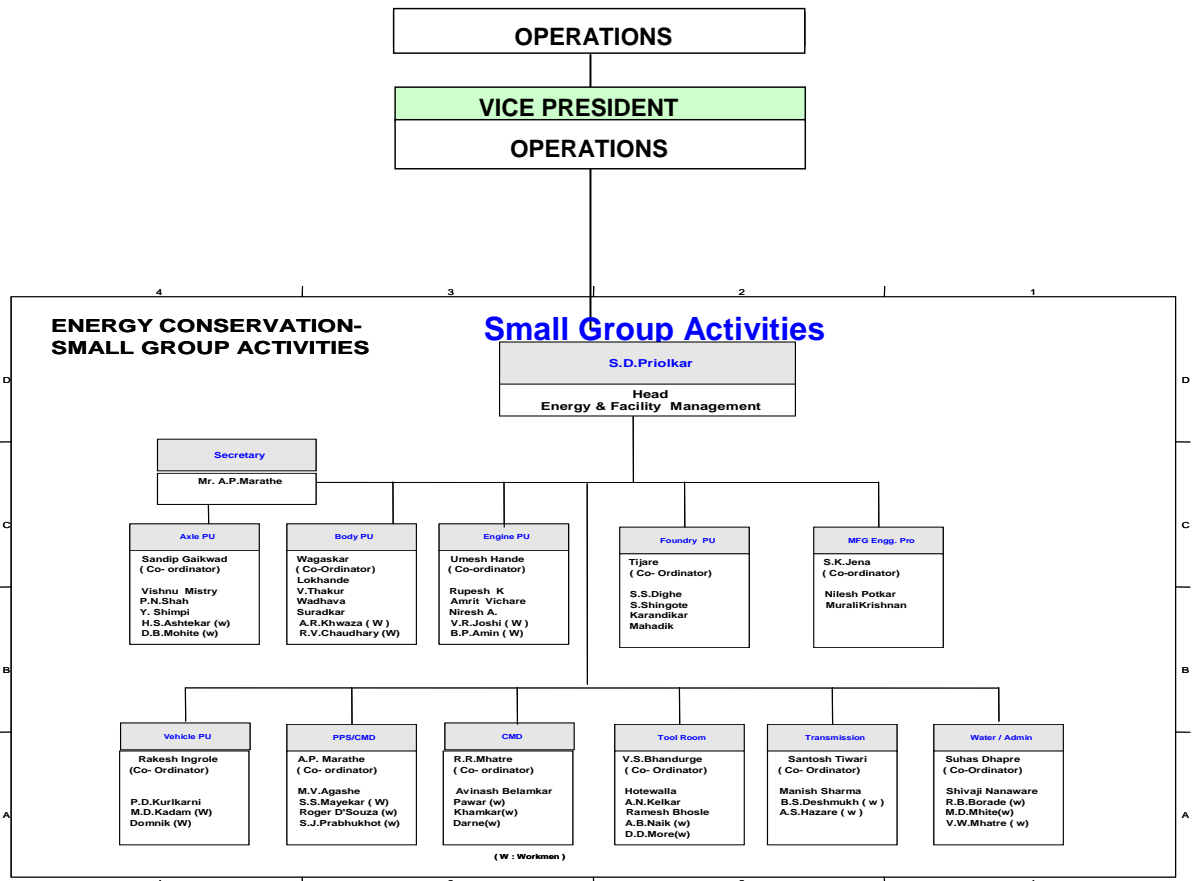
- 1) Nurture consciousness and enhance awareness on energy conservation through suitable programs.
- 2) To Identify & validate the energy conservation projects.
- 3) Energy budgeting, Energy financing , resources allocation & implementing Energy conservation project
- 4) Monitoring, reporting, reconciling and analyzing energy consumption data.
- 5) To conduct monthly review meeting for energy conservation projects.
- 6) Conduct internal & external energy audits to find more scope of improving energy efficiency
- 7) Application of latest technologies with due consideration on environmental impact.
- 8) Periodic education and training of personnel on energy management and conservation.
- 9) To arrange a brainstorming session to share / emerge energy efficiency ideas. The session is attended by representatives of other auto sector plants located at Nashik, Igatpuri, Zaheerabad and Haridwar.

Budget is allocated to Energy Efficiency projects by validating the feasibility, payback period and reduction in the specific energy consumption

### **Strategy of EC cell-**

- 1) Creating awareness campaigns for energy conservation.
  - 2) Participation of all the Employees through "Energy saving suggestion schemes".
  - 3) Work towards arriving at optimum energy levels for a process cycle.
  - 4) Use of Energy efficient equipments and encouraging 'Kaizens' for getting breakthrough improvement in cycle times
  - 5) Conduct internal & external energy audits to find more scope of improving energy efficiency.
  - 6) Work on Environmental Aspects and Clean Development Mechanism to reduce Global Warming.
  - 7) To increase Energy Efficiency awareness among vendors, suppliers.
  - 8) To conduct Energy Audit at vendor, supplier end to reduce overall energy consumption.
  - 9) To modify Energy Management policy. To circulate the policy to all plants of auto sector. To display the policy in each product unit.
  - 10) To celebrate energy conservation week every year during 14th to 21st December.
  - 11) Under Corporate Social Responsibility, to print and distribute leaflets and calendars containing Guidelines on Energy Saving among all employees, Mahindra Colonies and Mahindra School children
- The executives of the company have attended Energy Conservation Seminars, exhibitions organized by BEE, IIPM, PCRA. The Energy Managers of the company have shared the best practices at different forums. Energy Management policy is modified as a continual improvement effort.. The policy has been displayed in each section of the plant.

# Energy Conservation Cell



Mahindra & Mahindra Ltd.  
 Automotive Sector, Akurli Road,  
 Kandivli East, Mumbai - 400101  
 Tel : ( 022 ) 2887 4601 ( 16 lines)  
 Fax: ( 022 ) 2886 3434

## ENERGY MANAGEMENT POLICY

Mahindra & Mahindra Ltd. Automotive Sector are in the business of Designing & Manufacturing Vehicles . We are committed for high customer satisfaction through the process of continuous improvements in our Energy performance in all our operations.

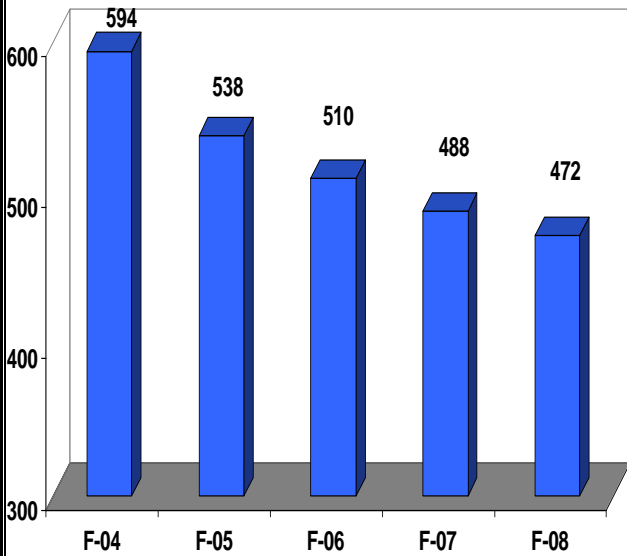
**We are committed to :**

- Bench mark specific energy consumption with National & International standards, and setting up systems to achieve them.
- Increase use of renewable energy & alternate fuel sources.
- Incorporate energy efficient designs & equipments in all projects.
- Conduct regular Energy Audits to optimize resources.
- Form small group activities to increase employee involvement.
- Promote Energy Efficiency movement among employees and society through various awareness programs.
- Recognise energy conservation initiatives taken by employees.
- Work with business associates in adopting energy conservation practices at their end.
- Ensure energy conservation measures are implemented in a safe and Environment friendly manner.
- Strengthen Energy Management Program through the enhancement of skills and competence of our employees.
- Reduce Energy cost continuously every year by adopting effective "Energy Management System".

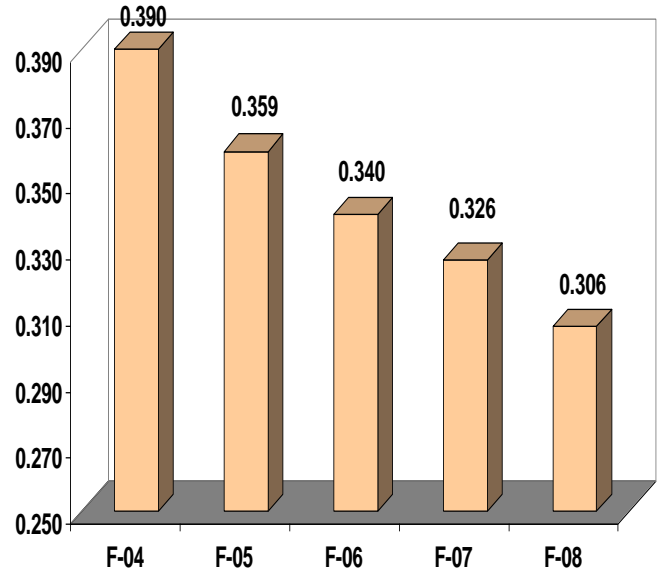
*(Signature)*  
**Vijay Dhongde**  
 Sr. Vice President - Mfg. Operations  
 Automotive Sector  
 1<sup>st</sup> August 2008

## Results

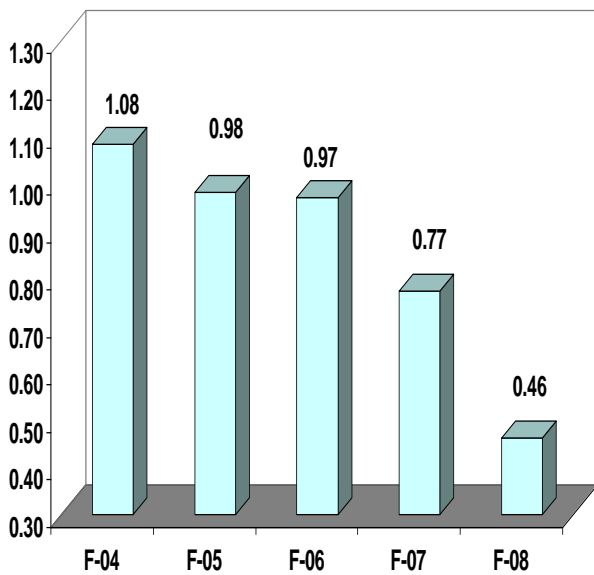
■ Electrical Consumption : KWH / Eq.Vehicle



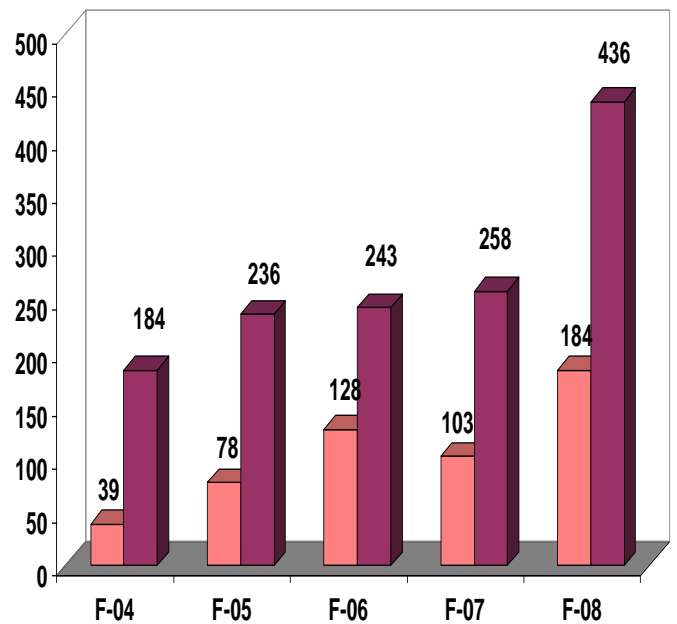
■ Gas Consumption : MKCal / Eq. Vehicle



■ Kerosene Consumption : Litre / Eq.Vehicle



■ Investment in Rs. Lacs   ■ Saving in Rs. Lacs



## Energy Conservation Achievements:

During the period between 2005 -2008 Mahindra & Mahindra Ltd. has implemented around 225 proposals through Engineering initiatives, workmen's suggestion schemes, Auditors recommendations and TPM methodology resulting into total saving of Rs 934.55 Lacs with an investment of Rs 414.81 Lacs.

This has resulted in 14.21 % saving of energy cost.

### a) Electrical Saving measures –

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



##### Before-

1. Inefficient old reciprocating air compressor.
2. Specific power consumption – 0.21kw/cfm

##### After -

1. Energy efficient screw compressor with spiral valve technology. Capacity-1475 scfm
2. Specific power consumption – 0.151 kw/cfm

**Cost Saving** – Rs. 4.17 Lacs/annum



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



##### Before-

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

##### After –

Installation of Energy efficient screw compressors at central air conditioning.

##### Cost Savings-

Rs. 10.19 Lacs/Annum



### 3. Temperature controller for window air conditioners



#### Before-

Thermostat control for window AC  
Compressor runs continuously.  
No precise setting of temp.  
Avg consumption of AC-1.27 Kwh/hr



#### After –

Programmable control for window AC  
Optimum running of compressor  
Temp set at 26 Deg .c  
Avg consumption of AC- 1.02 Kwh/hr

Installed for 162 window Air conditioners in plant

**Cost saving-** Rs-4.78 Lacs/annum

### 4. Replacing conventional hydraulic power packs with Energy efficient compact power packs



#### Before-

Conventional hydraulic power packs with spill types of directional control valve

Energy cost: : Rs 90000/annum



#### After-

Energy efficient compact hydraulic power packs with zero leakage poppet type of direction control valves.

Energy cost : Rs 4500/annum

**Cost Saving –** Rs. 85000 /annum

## 5. Variable frequency drive for Accessories top coat blowers in Paint shop



### Before-

Speed control with mechanical dampers

Frequency – 50 Hz

### After-

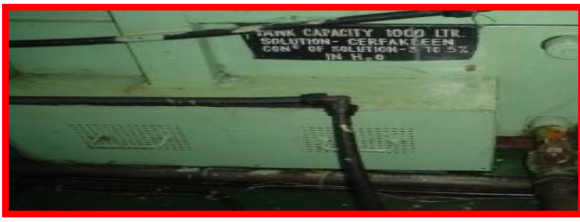
Speed control of air blowers with VFD

Frequency – 40 Hz

**Cost Saving** – Rs. 7.09 Lacs/annum

## B) Waste heat recovery projects

### 1.Heat Pump: Installation of Heat pump & thereby eliminated use of conventional electrical heaters for washing machine 1768 in TMPU



### Before :

Conventional Electrical heaters for washing m/c 1768 in TMPU

Operating Cost Rs. 3.53 Lacs /annum



### After :

Installation of energy saving heat pump which works on vapor compression cycle.

Operating Cost Rs. 1.49 Lacs /annum

**Cost Saving** – Rs.2.04 Lacs/annum

## 2. Super heat recovery from Air conditioning units.



### Before :

Conventional electrical heaters at washing machine.(36 kw)

Energy Consumption -93600 kwh/annum

### After :

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

Energy consumption-3600 kwh/annum

**Cost saving-** Rs. 5.09 lacs/annum



## c) Thermal Savings

### 1. Thermal energy saving by enhancing productivity at pretreatment process.



### Before

Body loading combination for pretreatment tank.

- 1.Single body shell + Acc
- 2.Single Flatbed cargo
3. One maxi cargo

PNG consumption -600 scm/day



### After-

Pretreatment tank size & bucket size enhanced .Traveling crane speed increased. Body loading combination for pretreatment process changed.

- 1.Two body shells+ Acc
2. Single floated cargo + maxi cargo
- 3.Two maxi cargo

PNG consumption – 300 scm /day

**Total Cost saving – Rs 10.60 Lacs/annum**

## 2. PNG instead of LPG for RX generator-3



### Before

LPG for RX gas generator for cracking purpose.

### After–

PNG instead of LPG for cracking for RX gas generator.

**Cost saving:** Rs 2.51 Lacs/annum

## d) Water management

### 1. Rain water harvesting



Rain water harvesting near activity centre to sustain the yields of ground water & to meet the bore well water demand.

It consists of filtration pond with stone aggregates 30-50 mm at the bottom & followed by sand at the top.

Rain water harvesting has improved not only quantity of ground water but also quality of water by reducing contamination & pollution in aquifer and sub soil zone

## e) Renewable Energy

### 1. Turbine air ventilators instead of Roof extractors



#### **Before :**

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

Electrical Consumption / Annum = 0.26 Lacs kwh/annum

#### **After :**

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

Electrical Consumption : Nil

Saving Rs- 1.49 Lacs/annum

### Other projects implemented during 2007-2008

- VFD for washing machine pumps at Engine PU.
- Heat pump for washing machine.
- Continuous to intermittent motors by modifying the circuits or using Programmable Logic Controls.
- Digital temp. controller for window AC's
- Stopping idle running of motors.
- Higher HP Motor to Lower HP Motor.
- Optimization of pressure losses in the pipe lines
- Flat belts instead of ' V ' belts for blowers.
- Energy efficient UPS at IDAM & EDP .
- Insulation for recuperators.
- Air boosters & regulators for compressed air.
- Use of metal halide lamp in place of mercury vapor lamp.
- Providing temp. Controller for cooling tower at utility

### Energy Conservation Plans and Targets:

Energy Conservation Measures (Planned)	Anticipated savings In Energy (Rs. lakhs)	Approx. Investment (Rs. Lakhs)	Project commencement & completion year
Automation of water system & replacing underground lines with overhead	10.00	8.00	2009
Waste heat recovery from compressor house to eliminate electrical heaters at vaporizer.	12.00	10.00	2009
Wind mill as non conventional energy source.	600	3700	2010
Data acquisition system for compressed air & Gas distribution system	3.00	4.00	2010
Solar water heating for pretreatment tanks in paint shop	12.00	35.00	2010
Direct firing for Body moisture dry off oven	4.00	12.00	2010
Variable frequency drive for red primer oven blowers	6.00	8.00	2010
Variable frequency drive for spot welding & utility cooling pumps	5.00	4.00	2010
Variable frequency drive for heat treatment oven blowers	3.00	3.00	2010

By adopting the above energy conservation measures, we will be able to achieve the set target of 458 KWH / Eq.vehicles by the year 2009.

## Safety, Health & Environment

At our Kandivli plant commitment and responsibility towards Safety, Occupational Health & Environment stems from its Vision, which enjoins upon our Company to sustain business growth with deep commitment towards Safety, Occupational Health & Environment.

### **New Certifications:**

The OHSAS system aims to eliminate or minimize risk to employees and other interested parties who may be exposed to OH&S risks associated with its activities. During the year 2007-08, the kandivli plant have been certified for Occupational Health and Safety Management System (***OHSAS 18001:2007***) ***amended standard***.

The plant is also certified with amended standard for Environmental Management System ISO 14001: 2004.

### **Ensuring compliance:**

The environmental performance of the plant is well within the limits in statutory guidelines for all operations. Major environmental parameters required are being regularly monitored and reported to the concerned / regulatory bodies. The plant continues to recognize the importance of all the state and national regulations and ensures its compliance at all times. The plant fulfills the required statutory requirements of Maharashtra State Pollution Control Board. The plant is a member of ' **Mumbai Hazardouse Waste Management**' which lifts all the Hazardous waste from the plant and dispose at the specified area.

## ***ENVIRONMENTAL INITIATIVES:***

### **Greenbelt Development:**

The plant is constantly endeavors to minimize the direct and indirect environmental impact of its business operations and strives to enrich the environment wherever possible.



Mr. Vijay Dandge VP – Operations & Mr. S. B. Parab GM – Aggregates planting the sapling

A.S Kandivli as apart of Mahindra Hariyali planted 21850 trees at Village bhavale near Thane,also in schools ,societies, Gardens & University of Mumbai,Kalina.

Plantation activity was unique itself due to involvement & support of the top management and whole heartedly participation of employees. Total 658 Volunteers participated in plantation.

World Environment Day is celebrated on 5<sup>th</sup> June every year displaying Banners & Environment Posters at various locations of Kandivli Plant.



Mr. K.S. Shinde, Sub Regional Officer from Maharashtra Pollution Control Board(MPCB), was the Chief Guest. Senior officials and Union representative were also present along with workmen and officers from various product units/depts.

The function began with Tree Plantation near the Employee Development Centre. Prizes were distributed by the Chief Guest to the winners of Slogan, Poster, suggestion, kaizen & essay competitions.

#### **Air Pollution Management:**

With a view to ensure that the operation of third parties (contractors, suppliers etc.) is not affecting the environment, PUC certification has been made mandatory for all vehicles entering the plant. Kandivli plant is using cleaner fuels i.e. PNG, LPG for its all operations by which, emissions levels are in control and much lesser than specified MPCB limits.

Kandivli Plant introduced an environment friendly Bolero Pik up flatbed CNG. This is the first CNG large Pik up model ( 1 to 1.5 tonne payload ) to be introduced in the country.



The Bolero Pik-Up CNG is based on the popular Bolero Pik-Up Flatbed which is Mahindra's largest selling model in the Large Pickup category.

The pick up vehicle is fuel-efficient and environment friendly. It was developed as a part of our sustainable mobility solutions program which illustrates M&M's commitment to the research, product development and advancement of the most cutting-edge technologies to bring about a cleaner and greener future.

The Bolero Pik-Up Flatbed CNG complies with BS III emission norms and incorporates state-of-the-art CNG technology.

**Safety Performance:**

The plant continues to strive to “Accident Reduction” in all its product units. We have considered trainees, FTE & Contract Workmen along with our employees for calculation of Accident Statistics. During the year 2007-08, the accidents have reduced substantially.

Safety, Occupational Health & Environment performance of the plant is reported to Group Management Board (GMB) members periodically. A healthy safety culture has been developed at all the levels of the plant.

During the year we have organized Safety Patrol Rounds. Proactive Safety Kaizens, reporting of near-miss incidents are encouraged to resolve the safety issues.

**Safety Training:**

Employees are exposed to Internal / External Auditors Training programs on EMS & OHSMS for competence building in Safety, Occupational Health and Environment. On shop floor morning meetings start with tool box talk in the form of regular SH&E briefings.

National Safety Day/Week and World Environment Day are celebrated successfully in coordination with external government officials. During the year 2007-08. a special Training Program on ***Safety in Construction and Contract Work*** was organized.

**External Safety Audits:**

During the year 2007-08, our company’s safety practices, Risk Assessment and SH&E management systems were audited by external agencies. The plant has received Mahindra Manufacturing Excellence Award (MMEA) SH&E award Fourth time in succession.

**Occupational Health Examination:**

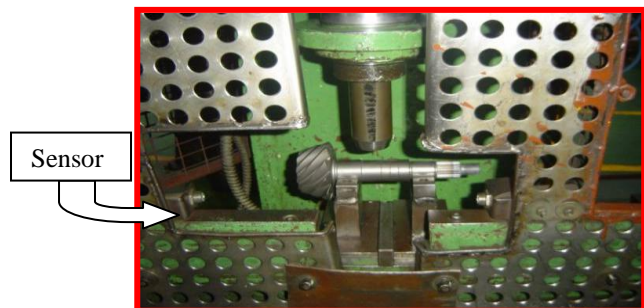
The plant continued its commitment to improve the well being of the employees. During the year 2007-08 the employees in Hazardous operations are medically examined twice and other employees from Non Hazardous operations are examined once as per Occupational Health Center schedule.

**Additional Efforts towards safety:-**



**Before**

There is possibility of operator fingers Getting trapped between ram and job



**After**

Sensor provided on both sides of fixture ,if operator hold job and pinion by one hand & operate the m/c, cycle will not start.

### Major Safety, Health , Environment Achievements:

- Converted 50 nos of panel coolers with CFC free refrigerant gas.
- Replaced 25 years old forklift engine with new MDI 3200 environment friendly engine which has reduced pollution level of forklift from 85 HSU to 35 HSU. The project has been implemented on five forklifts.
- Two Surveillance Audit successfully completed and sustenance for integrated management system for EMS & OHSMS i.e. ISO 14001:2004 & OHSAS 18001:2007.
- Auto Sector Kandivli plant received Finalist Certificate for Golden Peacock Award for Environmental Management System ISO 14001:2004 on 8<sup>th</sup> June 2007.
- Kandivli plant received first prize in Mahindra Manufacturing Excellence Award among all auto sector plants.
- Submission of Sustainability Reporting on Safety, Health & Environment.
- Provided guidance for execution in New Projects, expansion in Auto Sector relating to Environmental Impacts, Environment Clearance, Application of Consent and Factory License.
- Finalist for Golden Peacock Award for EMS.
- Guidance provided to Industries on the topic of Hazardous Waste Management through National Safety Council organised program.
- Conducted meeting for the industries from Jogeshwari to Dahisar as a Chief Convenor of Mutual Aid Response Group (MARG) for Off Site Emergency Plan.
- Represented as a Chief Convenor of Mutual Aid Response Group in District Level MARG Meeting to discuss "**OFF Site Emergency Plan**" invited by Collector of Mumbai (Suburbs).
- Introduction of Bharat Metal Cutting Gas in lieu of Acetylene Kandivli Plant for reduction in pollution and safety of employee.