

Igatpuri Unit Profile:

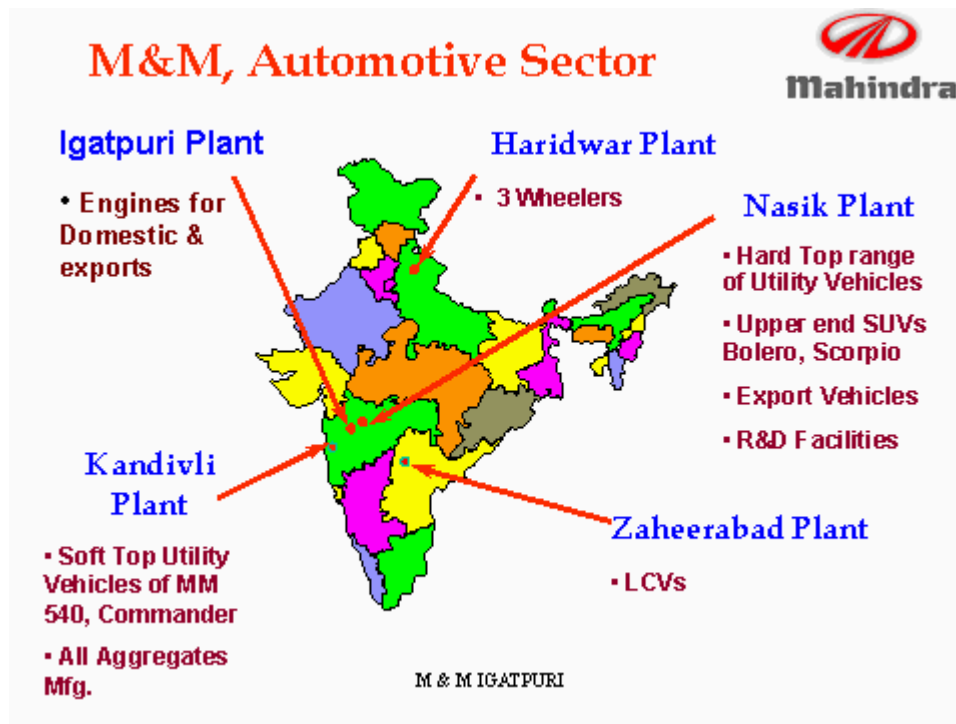
M&M's automotive division is in the business of manufacturing and marketing utility vehicles and LCV's with total sales turnover of around 4600 crores is the leader in this segment, with a market share in excess of 50 per cent. M&M automotive division has four manufacturing plants.

"Scorpio" is M&M's first indigenously developed Sports Utility Vehicle launched in June 2002 and has been universally acclaimed. Scorpio is declared "Car of the Year" by CNBC Autocar, BBC Wheels and Business Standard Motoring in the year 2003. The Company's automotive division also exports its products to several countries in Africa, Asia, European & Latin American countries.

In Maharashtra, its plants in Mumbai and Nasik manufacture Multi-utility vehicles, and **IC Engines** are produced at the **Igatpuri plant**. Light commercial vehicles and three-wheelers are manufactured at the Company's plant at Zaheerabad in Andhra Pradesh.

At Igatpuri, having 4,00,000 Sq. Mtr. Land with 46700Sq. Mtr. Built-up area, following types of basic IC Engines with 78 variants, are manufactured with total 871 employees :

- **NEF TCI DI & CRDe DIESEL ENGINES** :- 2.6ltr,53 to 81kW @ 3200 & 3800 RPM
- **MDI-3200TC DIESEL ENGINE** - 2.5 liter, 46.3kW @3200 RPM
- **XD3P-BSII DIESEL ENGINE** - 2.5 Ltr,46 kW @ 4500 RPM

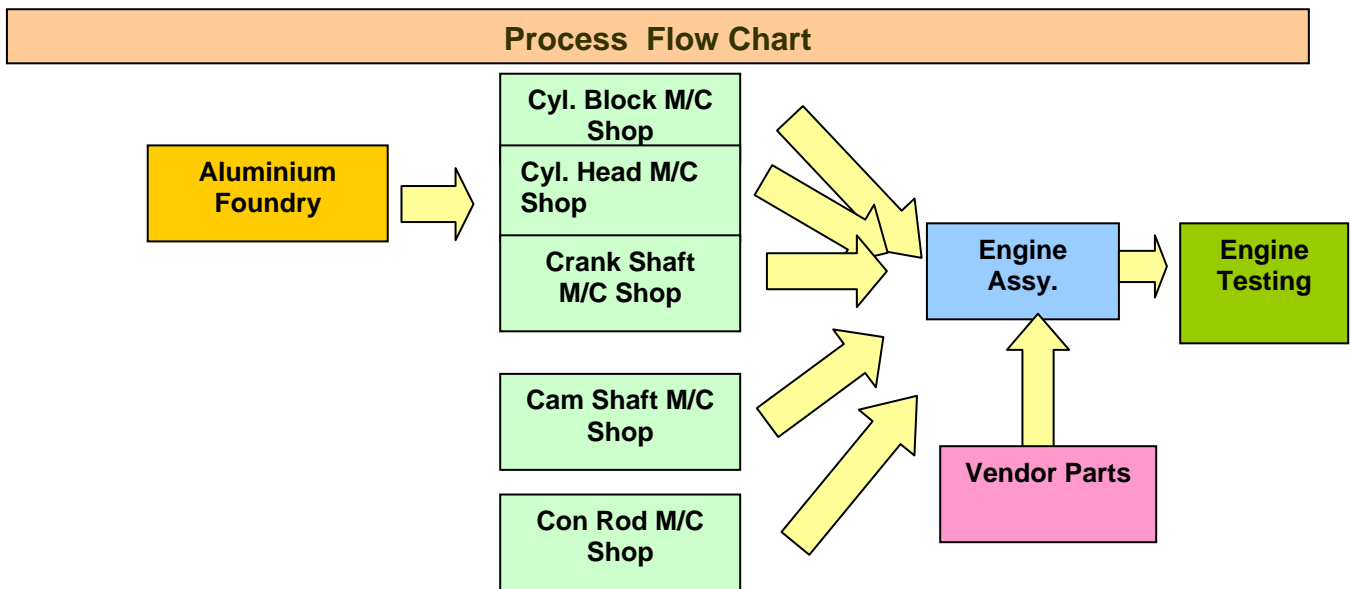


- **RENAULT F4R -ENGINE (EURO-III)** - 87kW @5500RPM
- **LX CRDi Engines**:-2.2Litr (85kW- 103kW)

The customers for Igatpuri Plant are All Vehicle Plants of M & M, Indian Army & Karsan Turkey.

Important milestones of Igatpuri Plant are :-

- Accredited with ISO 9000 in 1992 by TUV.
- Accredited with QS 9000 in 1998 by TUV.
- Adopted ERP – SAP in 1998.
- Accredited with ISO-14001 in 2002 by TUV.
- Accredited with TS 16946 in 2006 by TUV.
- Accredited with Information Security Management System ISO 27001 in 2006.
- Getting geared up for OHSAS 18001.



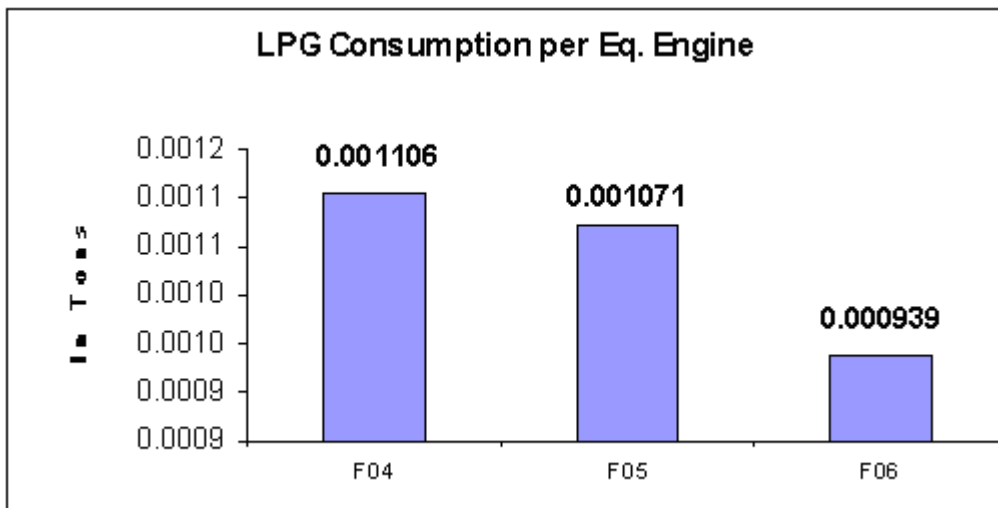
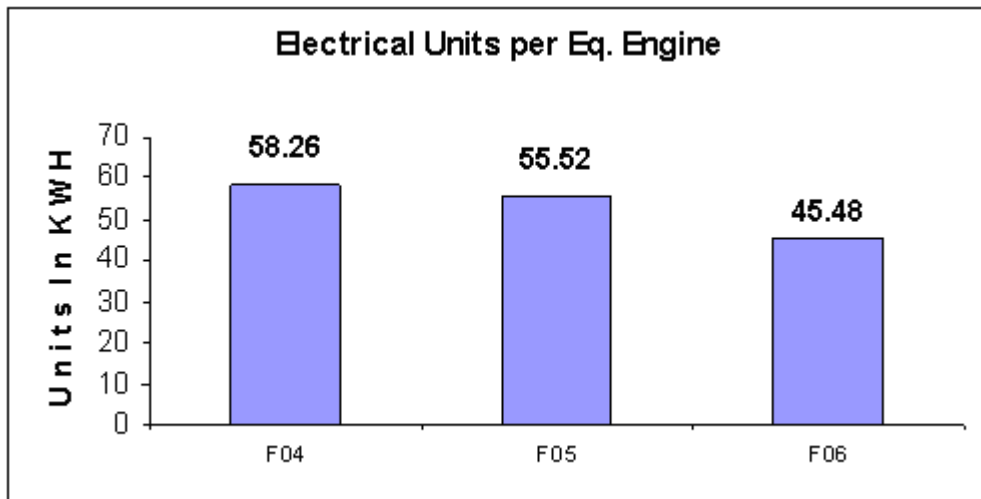
Energy Consumption:

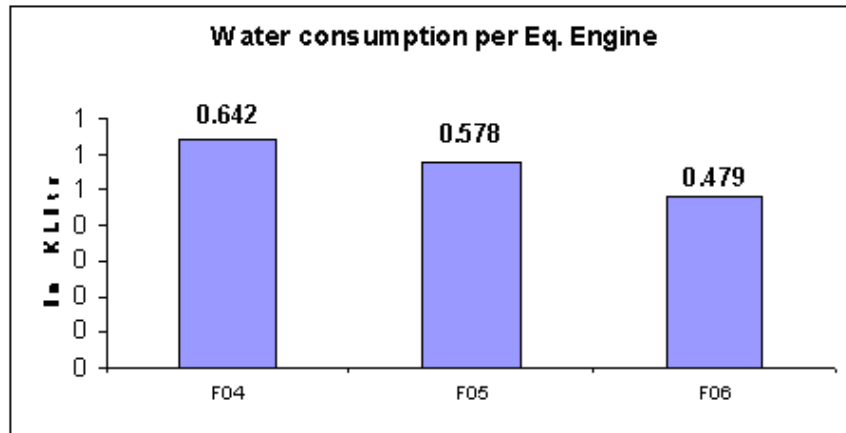
Igatpuri Plant uses Electricity as a prime energy source. Diesel Generators are used as a stand-by facility in case of interruption in power supply from State Electricity Company. High Speed Diesel is used for : 1) As a raw material for testing of IC Engines, 2) As Fuel by Diesel Genesets (stand by) & 3) For Plant vehicles & material Handling equipments like Forklifts. There has been a steady decrease in the Electrical Energy consumption per equivalent Engine due to the implementation of various energy conservation measures.

DESCRIPTION	UNIT	2003-2004	2004-2005	2005-2006
Annual Eq. Engines production	Nos.	122397	125899	150113
Total electrical energy consumption /annum	kWh	7131240	6990510	6827490
Specific energy consumption – Electrical	Units/Eq Engine	58.26	55.52	45.48
Total Thermal (Fuel) Consumption/annu	MKCals	Not Applicable	Not Applicable	Not Applicable
Specific energy consumption – Thermal (Fuel)	MKCals /eq. Engine	Not Applicable	Not Applicable	Not Applicable

Fuel Consumption Trend:

YEAR	ELECTRICITY		THERMAL (FUEL)	
	Consumption (kWh / Eq. Engine)	% reduction over 2003-2004	Consumption (MKCals/ Eq. Engine)	% reduction over 2000 - 2003
2003-2004	58.26	---	Not Applicable	---
2004-2005	55.52	4.7%	Not Applicable	---
2005-2006	45.48	21.9%	Not Applicable	---





Energy Conservation Commitment, Policy and Set Up:

Mahindra & Mahindra Ltd, Auto Sector considers Energy Saving as a multi disciplinary approach. The company's energy profile consists of Electricity, Gas, High Speed Diesel Oil and Water also. Budget provisions are made exclusively for Energy projects. Energy conservation plans, policy and structure are reviewed periodically. **ECON** Committee meetings are called fortnightly.

Energy Conservation week is celebrated every year from 14th December to 21st December. To increase Energy Conservation awareness, a poster and slogan competition on energy saving was conducted, In-house seminars are conducted & Officers & Technicians are send to attend Seminars & Exhibitions. The importance of energy conservation is emphasized through various forums, and **TPM** (Total Productive Maintenance) Methodology. By means of TPM, about 100 various small improvements i.e. Kaizens were implemented. Those are mainly for reduction of motors, resizing of motors, continuous to intermittent type circuits, improvement of illumination levels; ECON Team is visiting all the Shops & Offices & makes appeal to all the employees for conservation of Energy & Natural Resources. A **ECON Communication Board** is set up for displaying Information & Tips on Energy & Natural Resources conservation at workplace & at home as well.

The Senior Management of the Company demonstrates commitment to the energy efficiency cause through Budget Allocation for incorporating use of non-conventional sources of energy & alternate fuels.



Awareness Campaign



Mahindra

Mahindra & Mahindra Ltd.

Automotive Sector ,Akurli Road,
Kandivli East, Mumbai – 400101

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Fax:(022) 2886 3434

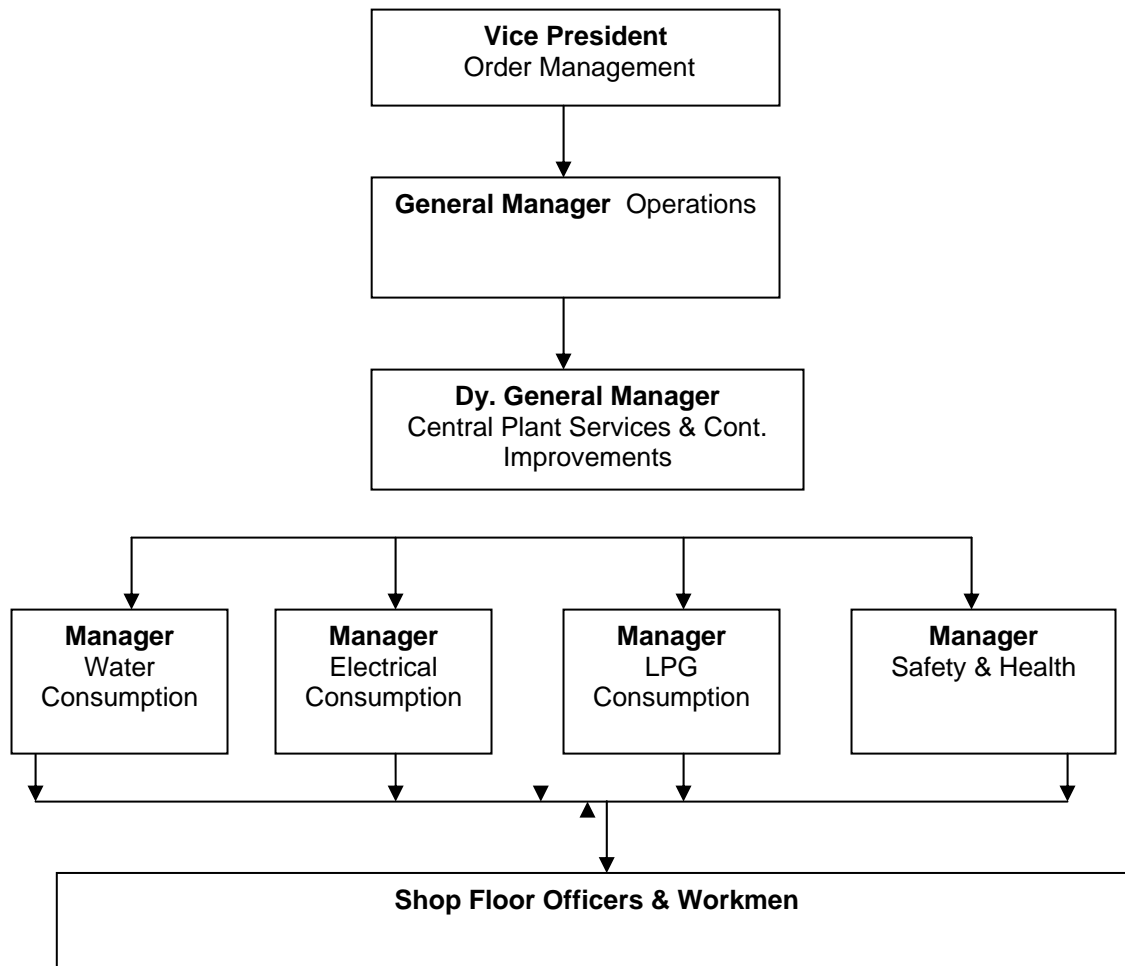
ENERGY MANAGEMENT POLICY

Mahindra & Mahindra Ltd, Automotive Sector are in the business of Designing & Manufacturing Multi Utility Vehicles with customer satisfaction through the process of continuous improvements in all areas of operations.

We are committed to:

- 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.
- Incorporate energy efficient designs & equipments in all projects.
- Conduct regular Energy Audits to reduce energy wastage in all areas.
- Formation of small group activities to increase employee involvement.
- Promote awareness among all employees through leaflets, seminars, competitions and company visits.
- Recognise energy conservation initiatives taken by employees and award them.
- Promote awareness among students, nearby areas through leaflets, seminars.
- To work with vendors and contractors in adopting energy conservation practices at their end.
- 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".

Rajan Wadhera
Vice President –Order Management.
Automotive Sector



ENVIRONMENTAL POLICY

We, at Mahindra & Mahindra Ltd., Automotive Sector, Igatpuri Engine Plant are in the business of Manufacturing of diesel, petrol engines and engine components for utility and light commercial vehicles.

We are committed to:

- ❑ The Protection of Environment by Prevention of Pollution and Continual Improvement in the Environmental Performance.
- ❑ Implement Environment Management System conforming to ISO 14001.
- ❑ Comply with Environmental Legislation and other Regulations.
- ❑ Promote Energy saving and Conservation of Resources.
- ❑ Minimize Waste generation and Promote disposal, reuse and recycling in an environmental friendly manner.
- ❑ Communicate Environment Policy to all employees and encourage their involvement through training and participation.
- ❑ Promote awareness among Contractors and Suppliers towards Environment Protection.
- ❑ Make Environment Policy available to the Public at request.

Commitments towards Environment protection & Natural Resources Utilization :

- ❖ Legislation awareness Training Programme for Igatpuri Plant Steering Committee & Plant Operating Team.
- ❖ EMS 14001 & Environment Training Programme to Govt. Teachers. From Igatpuri Taluka.

- ❖ Training Programme on “How to handle & face emergency during L.P.G. handling & using” to all Key persons. (Stores, Foundry & Tool room).
- ❖ Training Programme on “Manual Material Handling” to contractor's employees.
- ❖ Replacing Freon Gases with Eco-Friendly Refrigeration Gas.
- ❖ Tree plantation in the Plant Premises.
- ❖ Tree plantation in the Igatpuri Town.
- ❖ Distribution of Sapling to all employees.
- ❖ Collection of Rain water for Gardening.
- ❖ Using Rain water flowing from roofs for top up of cooling towers.
- ❖ Using Rain water flowing from roofs for human touch.
- ❖ Bio Filter Plant for Canteen Waste water Treatment
- ❖ OIL - WATER Emulsion gravity separator (Treatment of waste water containing oil from engine testing area.)
- ❖ OIL - WATER Emulsion Electro Mechanical Separator.
- ❖ Vermiculture

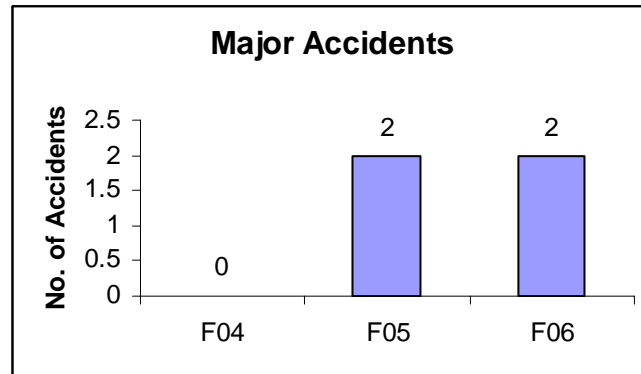


Distribution of Saplings by the hands of General Manager

Safety

- Safety Committee meetings are called on weekly basis.
- Training to all employees about SHE, Fire Prevention, First Aid, on site Emergency & Ergonomics.
- Patrol Rounds.
- Identifying Occupational Health Hazards if any & over come.
- Training & Identification & on Unsafe Act.
- Audit of Accidents due to Poor JH (Autonomous Maintenance).
- Kaizens / Poka yokes to eliminate unsafe conditions.
- Competition held on safety subjects - slogans, posters, easy to promote awareness.

- Safety rotating shield constituted to be conferred on 2nd October, Founders' Day to promote healthy competition among departments in observing safety rules & promote safe clean working environment
- Injury report from Dispensary is being published on daily basis
- Muda / Environment Concerns Identification & Elimination in Environment Management (ISO 14001).



Electrical Safety Audit process initiated for entire Plant Distribution Sys. To ensure Electrical safety

Conservation of Energy

Awareness Program



Del-Star Converter



DEL STAR CONVERTER CONNECTED ON M/C 2030

- WITH OUT
DELSTAR --- 4.3
K.WH per Cyl.
Block
- WITH DELSTAR --- 3.1
K.WH per Cyl.
Block

Saving of Rs.0.37 Lac per Annum

Timer on Compressed Air Line



- Cut off air flow during lunch, tea break and on Holidays
& reduce idle consumption of compressed air.

Action : Provided electro pneumatic solenoid switch with timer on main header.

Saving of 1.03 Lac Units/Year



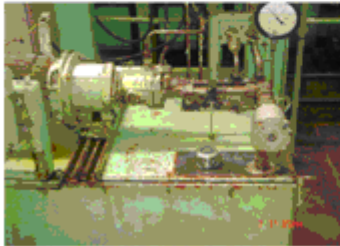
Saving of Rs. 4.32 Lac per Annum



Re-sizing of Machine connected load



- Total Load before resizing (Comprising of Oil cooler & Hyd pump motor 10HP) = 12.7 HP
- Total Load after re-sizing = 5 HP (Removal of Oil cooler & reduction in motor size)



Total Load removed = 7.5HP

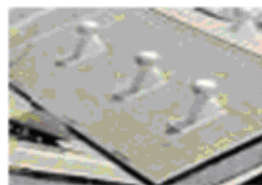
Saving of Rs. 0.44 Lac per Annum



Roof Heat Extractor – Air Ventilator



- Roof Extractors are installed on roof to extract hot air from under the roof, **which operates due to wind velocity.**
- Total Installations : 26 Nos.
- Likely electrical consumption by exhaust fans (750W) : 8.11Lac Units/Year



Investment Rs.1.85 Lacs.

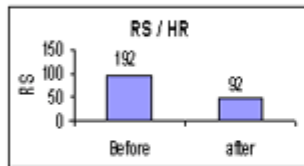
Saving :: 0.91 Lac Units
(Other benefit :: Ambient Temp. reduced by 3-5 deg. Celsius)

Saving of Rs. 4.65 Lac per Annum



Re-sizing of Cooling water pump

Eliminate over loading of pump



Before : 20 Hp pump was used with valve on out let throttled which resulted in overloading.

After : Replaced with 15 Hp pump , no throttling of valve.

Result : Reduction in Power consumption & Long life of the pump.

Investment : Rs. 1.5 Lacs

Saving 2.59 Lacs Units/Year

Saving of Rs. 11.23 Lac per Annum



Replacing Std. Pump with Energy Efficient Pump



Before



After

Reduce Electrical consumption on Cooling water pumps by adopting new technology

- Before : 25 Hp Water pumps used for Engine Test beds = 18.6 KW

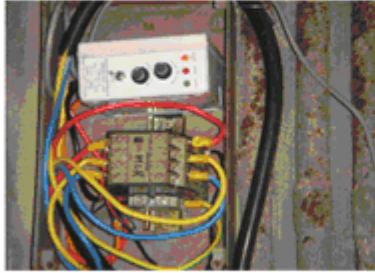
- After : 10Hp water pump with EE motor = 7.5KW

Saving of 53712 KWH/Year

Saving of Rs. 2.74 Lac per Annum



Photo-cell for Lighting control



- Put off unwanted lights in Shop-floor during bright day. (Approx. duration 3-5 Hrs)
- Incorporated "Day light Sensor (Photo-cell)" in one section of Lighting circuit.
- **Saving 0.108 Lac Units**

Saving of Rs. 0.56 Lac per Annum



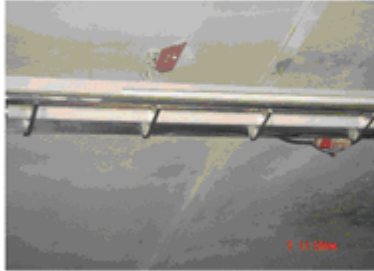
Scroll Compressor



- Reduce electrical consumption on air dryer by replacing new technology Scroll Compressor.
- **Before:** Reciprocating Compressor consuming 1.97 kW
- **After :** Replacing Recip. Compressor with Scroll Compressor consuming 1.06 kW
- **Saving in Electrical units 4368 Units**

Saving of Rs. 0.22 Lac per Annum

Mirror Optic Reflectors

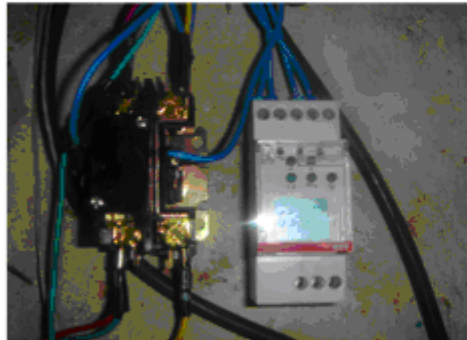


- Lux level was improved from 200 Lux to 300 Lux by retrofitting Mirror optic reflectors on tubes in Engine Assy, instead of adding to lighting fixtures & thus additional electrical consumption was avoided

**Consumption of Total
0.17 Lac Units
avoided**

Saving of Rs. 0.73 Lac per Annum

Timer for Ultra Low Temp. Chiller



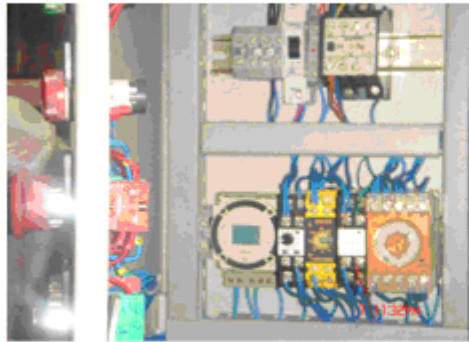
- Installation of time switch on Ultra low temp. chiller to save energy consumption
- **Before** : 2 KW connected load was remaining ON when not required in IIIrd shift
- **After** : Incorporated programmable timer in Circuit to avoid un-necessary running of Chiller.

Saving of 5760 Units

Saving of Rs. 0.30 Lac per Annum



Timer of Air Circulators



- Avoid running of Air Circulators when not required & thereby reduce electrical consumption.
- **Before** : Air circulators in one of the machine shops used to remain ON during Tee/Lunch time & shift change over
- **After** : Incorporated one timer for all the 5 fans.

Saving of 2812.5 Units

Saving of Rs. 0.14 Lac per Annum

Conservation of Natural Resources & Re-cycling



Rain Water Harvesting.



- Rain water falling on roof was getting drained into gutter, which was collected & diverted to Compressor cooling tank. This helped in reduction in purchased water quantity.
- **In monsoon, total 2817 M3 rain water was diverted to cooling water tank**

(Jeewan Pradhikaran water Rate Rs. 42/Kltr)

Saving of Rs. 1.18 Lac per Annum



Use of Pozzocrete in Place of Cement

- Pozzocrete is the fly ash product first time introduced by M&M Igatpuri for Road Construction work in Officer's colony.
- Subsequently used for Revamping Project in the Plant.
- **Net cost saving is Rs. 1 Lacs.**



Conservation of Fuel

- Diesel is used for Testing of IC Engines manufactured in Igatpuri Plant.
- Testing cycle of the NEF Engine was brought down from 20 Minutes to 10 Minutes
- **Diesel saving per engine by Rs. 87/- (Per month Saving Rs 348000)**
- **Other benefits : Less Air Pollution, Less Noise Pollution**

Saving of Rs. 41.76 Lac per Annum