

Mahindra & Mahindra Limited

Zaheerabad unit, Medak, Andhra Pradesh

20. i) Unit Profile :

Mahindra is a \$ US 4.5 Billion group and is among the top 10 Industrial Houses in India. It is a fast growing business house and has already made its presence in 7 different sectors. With over 6 decades of manufacturing experience, the Mahindra 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 employs over 40,000 people and has several state-of-the-art facilities in India and overseas.

The Automotive sector has five manufacturing units, three in the state of Maharashtra located at Kandvili, Igatpuri & Nasik ; fourth unit located at Zaheerabad, Medak- Andhra Pradesh and the fifth unit located at Haridwar, Uttaranchal.



Mahindra & Mahindra Ltd. – Zaheerabad unit, Medak - AP

The Zaheerabad unit is a certified with ISO / TS 16949 – 2002, ISO 14001:2004 & OHSAS 18001:2007. The plant was started in the year 1985 in the name of Allwyn Nissan Ltd. and merged with Mahindra & Mahindra Ltd. in the year 1994. Zaheerabad unit is the first LCV manufacturer to provide CRDE Technology in engine complying BS III standards. The unit has bagged the “State Level Energy Conservation Award from “Andhra Pradesh Productivity Council” for year 2007 and was a runner-up in the “National Energy Conservation Award - 2006” & got first prize in 2007 conducted by the Bureau of Energy Efficiency. The unit’s mantra for success is the customer satisfaction & continuous improvement.

The unit has entered into various export markets of Asian & African countries. In this global competitive market Mahindra has sustained because of more customer focus and Energy management for reducing the operational & energy cost. Various small group activities like Ingenious Drive teams, Jishu Hozen Circles, Kobetsu Kaizen Teams etc. have been formed with senior executives as a facilitators / mentors to identify & implement the Energy conservation projects.

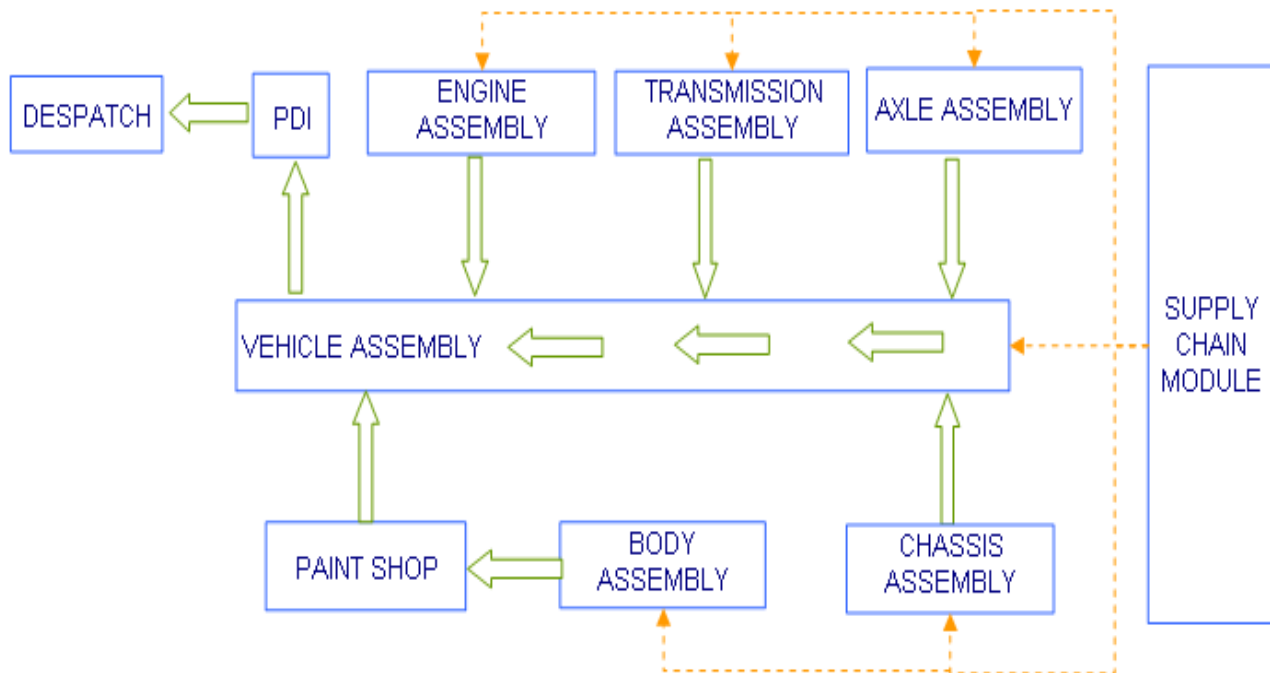
The Mahindra & Mahindra Ltd, - Zaheerabad unit is basically a vehicle assembly unit producing about 48 various models of LCV, Buses, Multi-Utility vehicles & 3 Wheelers. 90% of the manufacturing cost is vehicle assembly parts cost itself and the energy cost is in the order of 1.06% of manufacturing cost.

One of the unique features of this plant is its total dependence on bore well water as it does not get water supply from the state administration. The plant has taken stringent measures to become self sustainable by conserving water through rainwater harvesting, ETP – Waste water treatment, Bio filter treatment plant, Green belt Development, environmental aspects like Clean Development Mechanism(CDM) etc.

As a good corporate governance, top management committed not only to save energy but also to offset the carbon foot print generated by us by various activities such as power consumption & burning fossil fuels such as LPG & Diesel. In view of this we initiated the activities which resulted in CO2 emission savings are more than the CO2 emissions generated. By this way we are protecting the people, environment & planet from Global warming.

20. ii) Process Flow Chart :

Zaheerabad unit's production process flow is as below. Similar five production process flows for Cab king, MAXX, Champion family, ALFA and Sherpa & Tourister are existing to meet the production planning.



20. iii) Energy Consumption:

By implementing various energy conservation measures at the Zaheerabad unit, there has been consistent decrease in the Specific electrical & Thermal energy consumptions.

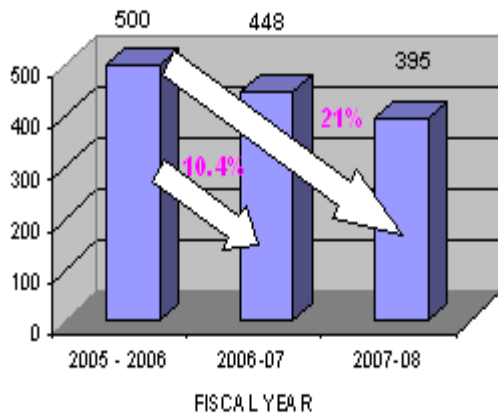
20 (ii) Energy Consumption

Description	Unit	2005 - 2006	2006-07	2007-08
Annual equivalent vehicles produced	No's	17294	22152	28151
Total Electrical energy consumption per annum	Lac. kWh	87	102	111.32
Specific electrical energy consumption	kWh/ equivalent vehicle	500	448	395
Total thermal (Fuel) consumption per annum	Lakh M ³	2.26	2.60	2.72
	Million K Cals/ annum	3571	4103	4296
Specific thermal energy consumption per annum	Million K Cals/ equivalent vehicle	0.206	0.185	0.153
Energy Cost as % of Manufacturing cost	%	1.360	1.060	0.940
No. of energy conservation measures taken up	No's	681	1448	1847
total energy savings	Lakhs Rs.	113	348	211

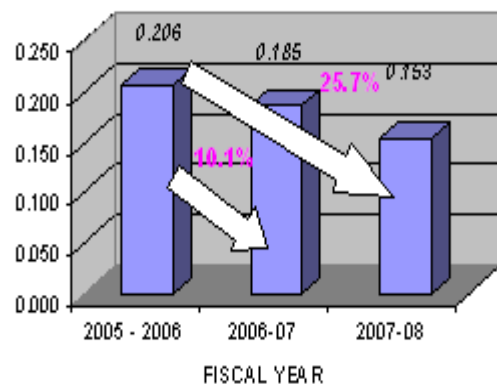
Year	Electrical energy		Thermal energy	
	Consumption kWh/ equivalent vehicle	% reduction over 2005-06	Consumption Million K Cals / equivalent vehicle	% reduction over 2003-04
2005 - 2006	500	--	0.206	--
2006-2007	448	10.40	0.185	10.19
2007-2008	395	21.00	0.153	25.73

Energy Consumption Trends:

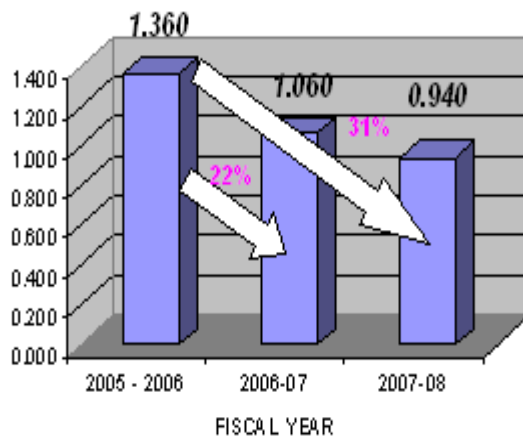
SPECIFIC POWER CONSUMPTION IN KWH / EQ. VEH



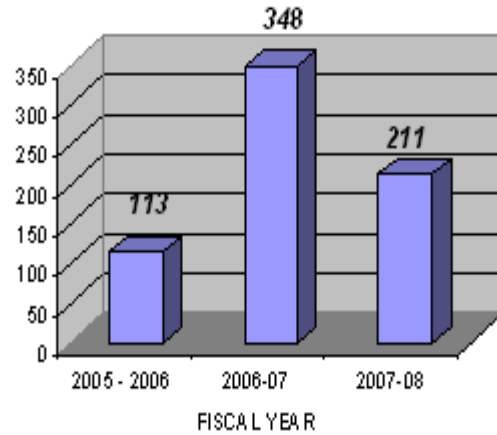
SPECIFIC THERMAL ENERGY CONSUMPTION PER EQ. VEH IN MKCAL / EQ. VEH



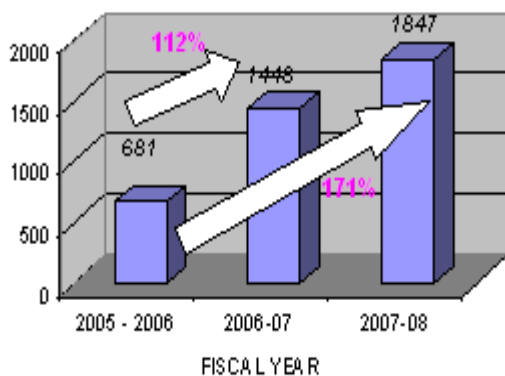
ENERGY COST AS % OF MFG COST



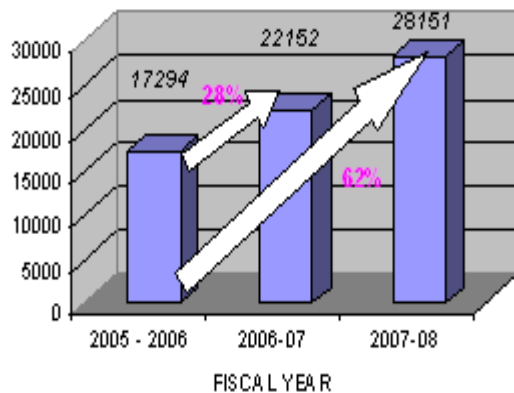
ENERGY SAVING COST IN RS. LAKHS



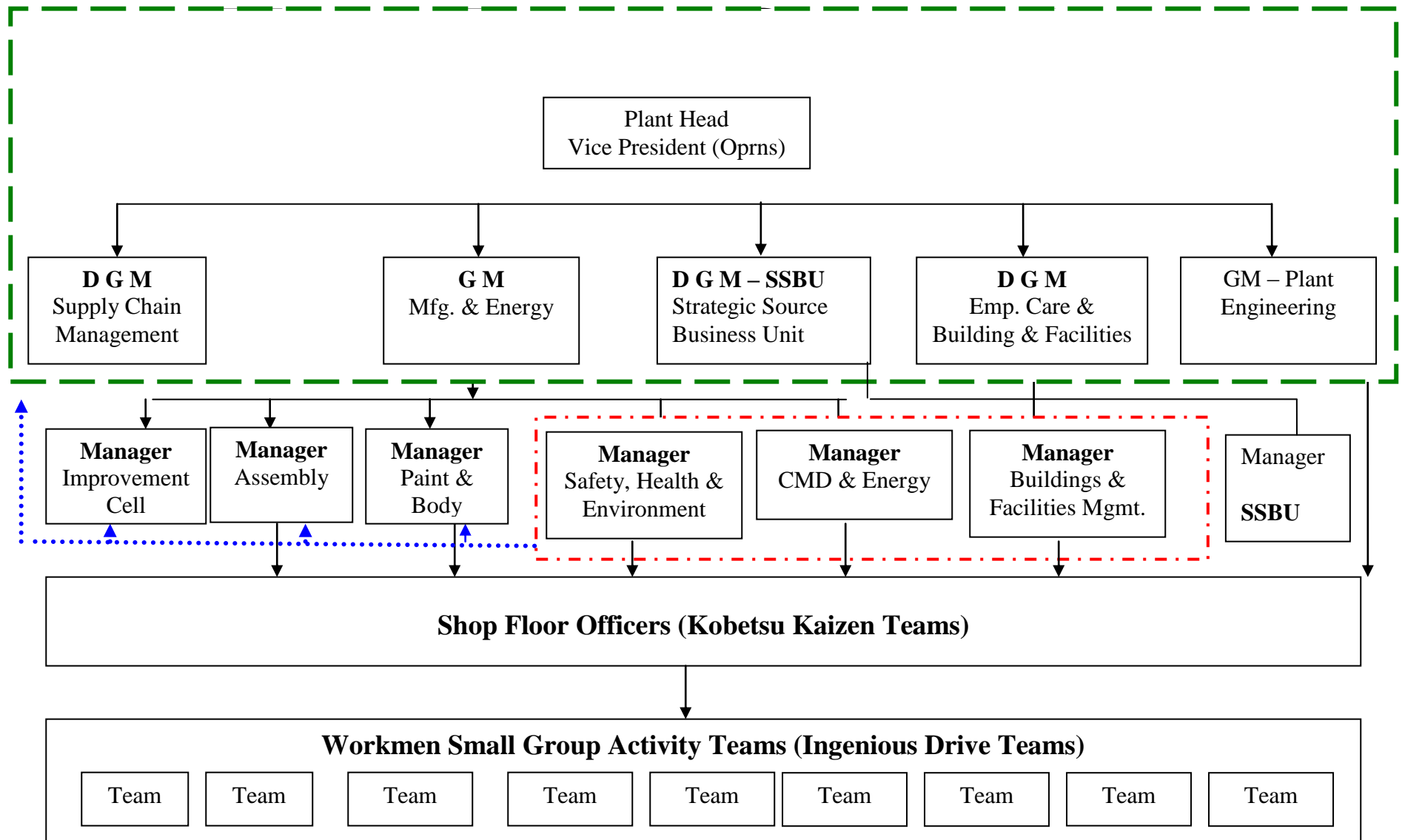
NO. OF ENERGY CONSERVATION MEASURES TAKEN UP



EQUIVALENT VEHICLES PRODUCED



Energy Conservation (ENCON) – Cell structure



GM

Small Group Activities – Ingenious Drive team structure

There are 41  constituted on functional location basis.

Each team has 10 ~ 12 workmen.

1 workman leads this team.

1 officer will be facilitator of the team.

1 Manager will be the mentor of the teams in his Department.

20. IV) Energy Conservation commitment, policy and set up:

Commitment

Mahindra & Mahindra Ltd., Automotive sector, Zaheerabad unit strongly believes that Energy saving is a multi disciplinary approach. The Plant's energy profile consists of electricity, HSD, compressed air, LPG and water. The LPG consumption is the major part of the energy consumption. Even smallest energy conservation is going to add directly to its bottom line profits. Energy management policy, conservation plans (ENCON), its implementation & periodic status reviews are closely monitored by the top management. Energy audits are regularly conducted by external agencies like CII, Ingersoll-Rand, synergy services etc. in addition to the in-house energy manager's audits.

Energy Management policy is displayed everywhere in the plant for creating energy conservation awareness. Every ENCON is taken to implementation and the best ENCON is identified and rewarded/awarded accordingly. The company has adopted the TPM (Total Productive Management) methodology for its excellence in performance. The company had formed cross functional teams (CFT) headed by a senior executive as facilitator / mentor for cost reduction through energy savings. As many as 1446 Kaizens (Double over F'06) like energy substation, derating of the equipment suitable to site conditions, Capacity utilization of the equipments, eliminating idle operation, optimization of air pressure etc. have been done & implemented in F'07

Energy Management Policy:



Mahindra & Mahindra Ltd.

Automotive Sector, Akurli Road,
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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".

Vijay Dhongde
Sr. Vice President – Mfg. Operations
Automotive Sector
1st August 2008

Energy Management set up

Energy conservation & energy efficiency in all operations is a top management priority for the unit. The below shows the set up following at the Zaheerabad unit for energy conservation



9 Pillars of Energy Conservation:

9 pillars of Energy management

Top Management commitment

Energy Monitoring system

Adoption of New technologies at the planning & Operational stage

Efficient use of Energy

Total Employee participation, Recognition & Rewarding scheme

Switching to renewable sources of Energy & Alternative fuels

Regular Energy Audits Regular / External

Energy Conservation at Vendors end

Commitment of all Employees

SWOT Analysis for Energy Conservation:

SWOT ANALYSIS FOR ENERGY CONSERVATION

Strengths:

- 1) A well balanced staffing compliment
- 2) An established organisation and recognised by government as lead agency for energy sector plpanning
- 3) A good relation with stake holders
- 4) Top manangement commitement

Weakness:

- 1) Lack of strategic direction
- 2) Lack of technical expertise in certain areas
- 3) Low volumes of production.
- 4) Inadequate funding to cater for resource assesment and research programmes and to meet demand from communities
- 5)Lack of focuss on energy efficiency

Opportunities:

- 1) Switching over of the entire plant to Renewable sources of Energy
- 2) Recruit and retained qualified personnel
- 3) Improvement on management capabilities.
- 4) Introduce appropriate policies and regulations governing energy sector development
- 5)Specialised training

Threats:

- 1) Continuous fluctuation in Crude oil prices
- 2) Loosing of trained staff
- 3) Scarce oil reserves (Oil/Fuel)

Energy Conservation Methodology:

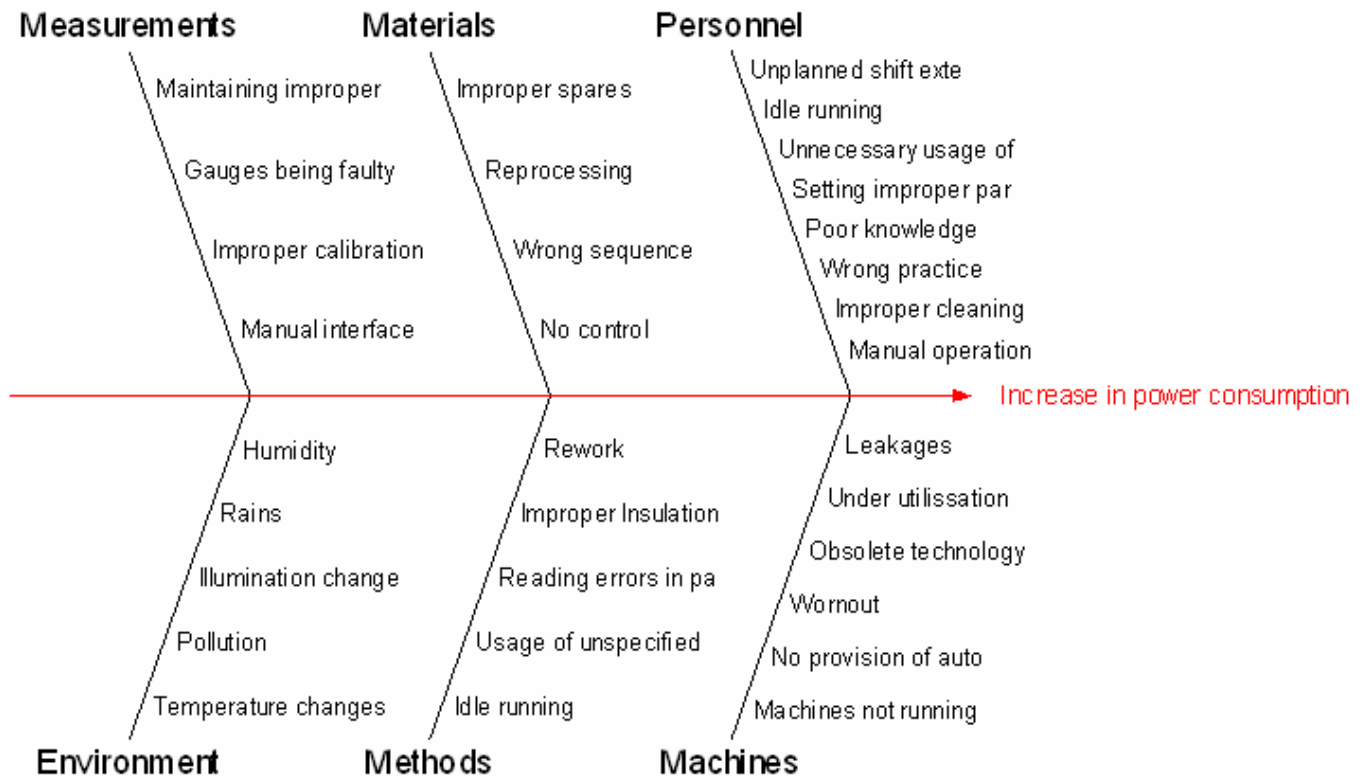
Define the project
 Brain storming & Data Collection
 Data Analysis (Tools Used)
 Benchmarking & Targeting
 Improvement & Innovations
 Sustenance & Control
 Future scope

Project Selection Criteria:

<p>Sample:</p> <ul style="list-style-type: none"> * VFD for Frame turn over m/c * Installation of Capacitor bank 300kvar * Improvement of efficiency of pumps. * Introduction of PID control operation for boilers <p style="writing-mode: vertical-rl; transform: rotate(180deg);">More time</p>	<ul style="list-style-type: none"> * Central Energy monitoring system * Installation of LPG saver Flux device on the Gas train *SCADA monitoring for Total plant monitoring *VFD for chilling circulation pumps. * Fixing of On/Off control valves at chilling lines * Replacement of Efficient transformers
<ul style="list-style-type: none"> * Installation of Solar water heaters & solar Lighting. *Low LPM Pumps for UF Rinse *Installation of Air alert system compressors *PLC interlocks for idle running *Single pump operation instead two pumps * Conversion of V belt drive to flat belt drive <p style="writing-mode: vertical-rl; transform: rotate(180deg);">Less Time</p>	<ul style="list-style-type: none"> * Installation of VFD for blowers, Chain conveyer * Installation of Low voltage lighting Transformer for paint and body shop * Temperature controlled (delta T) for Cooling towers
<p>Low Cost</p>	<p>High cost</p>

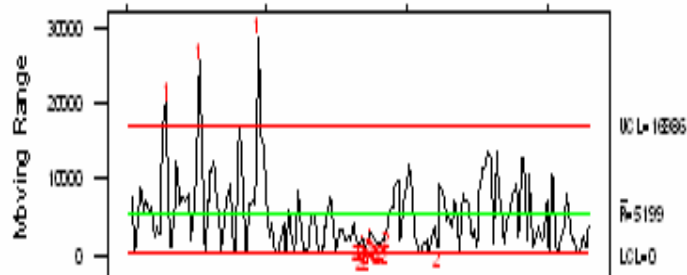
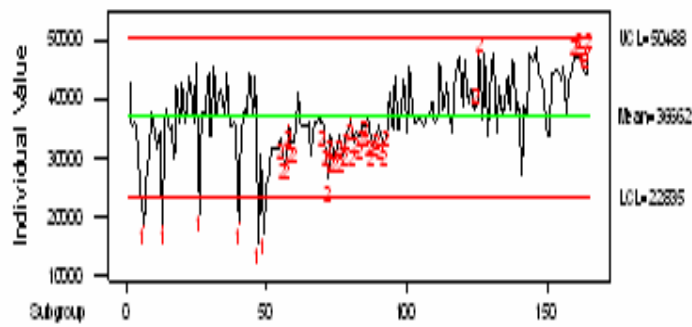
Data Analysis & Tools :

FishBone analysis for power consumption(before)

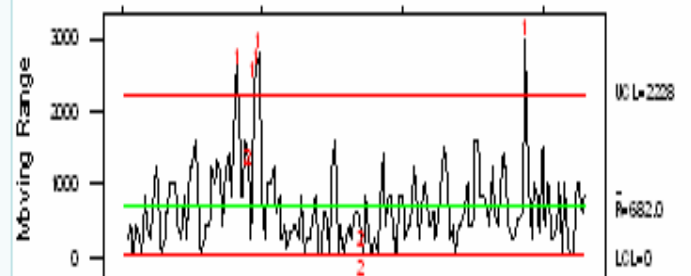
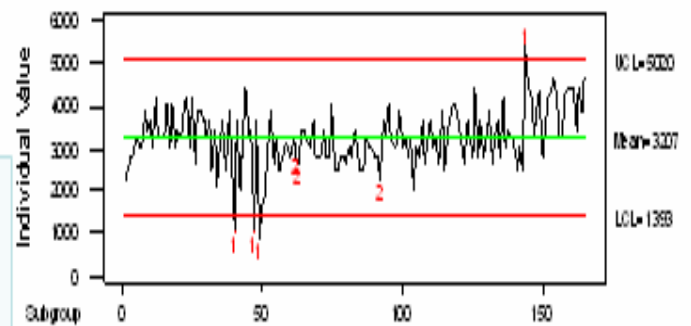


I & MR Charts for Energy Conservation :

I and MR Chart for APSEB_DailyR



I and MR Chart for LPG_Consumpt



Descriptive Statistics: APSEB_DailyReading, PF, VFD, MCC_06, PCCP_2, EDown

Variable	N	Mean	Median	Iqr	StDev	SE Mean
APSEB_Da	165	36662	36100	37031	6560	511
PF	165	0.95921	0.96000	0.95839	0.01325	0.00103
VFD	165	589.9	568.0	591.3	163.6	12.7
MCC_06	165	199.6	120.0	167.4	266.4	20.7
PCCP_2	165	8239	7248	7729	7457	581
EDown	165	485.06	470.00	487.95	98.50	7.67

Variable	Minimum	Maximum	Q1	Q3
APSEB_Da	14800	48000	33400	42050
PF	0.93000	1.00000	0.95000	0.96000
VFD	0.0	1032.0	504.0	680.0
MCC_06	0.0	2150.0	81.0	180.0
PCCP_2	840	101040	6864	9036
EDown	0.00	675.00	445.00	577.50