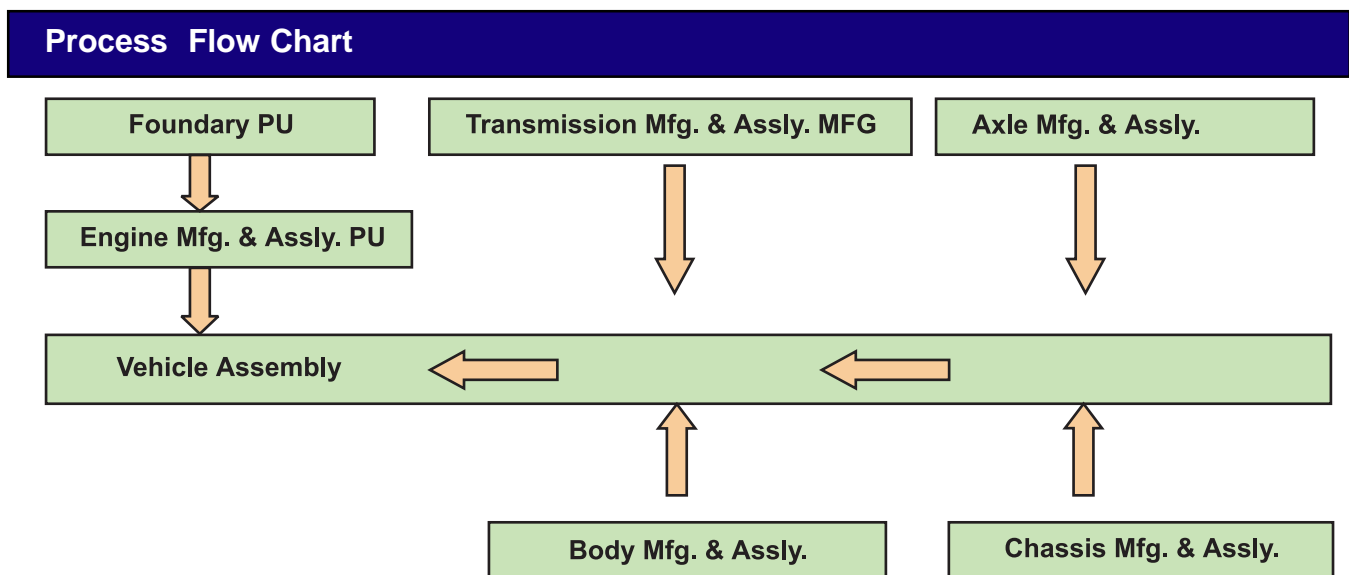


MAHINDRA & MAHINDRA LIMITED Kandivli (East), Mumbai (Maharashtra)

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

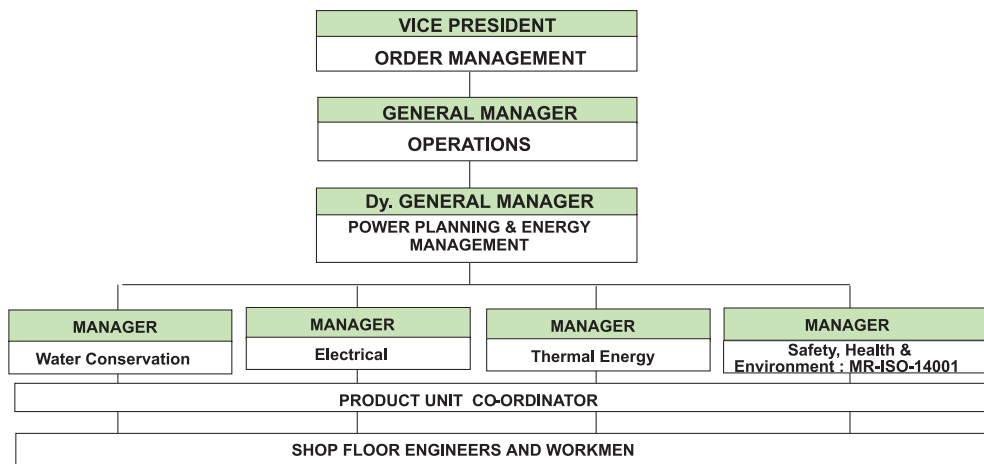
and Environment Department is also closely attached with Energy Conservation Cell. Top management like president, vice- president, General managers actively participate in the energy conservation program and support the energy conservation plans by providing the necessary budgetary and morale help.

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.

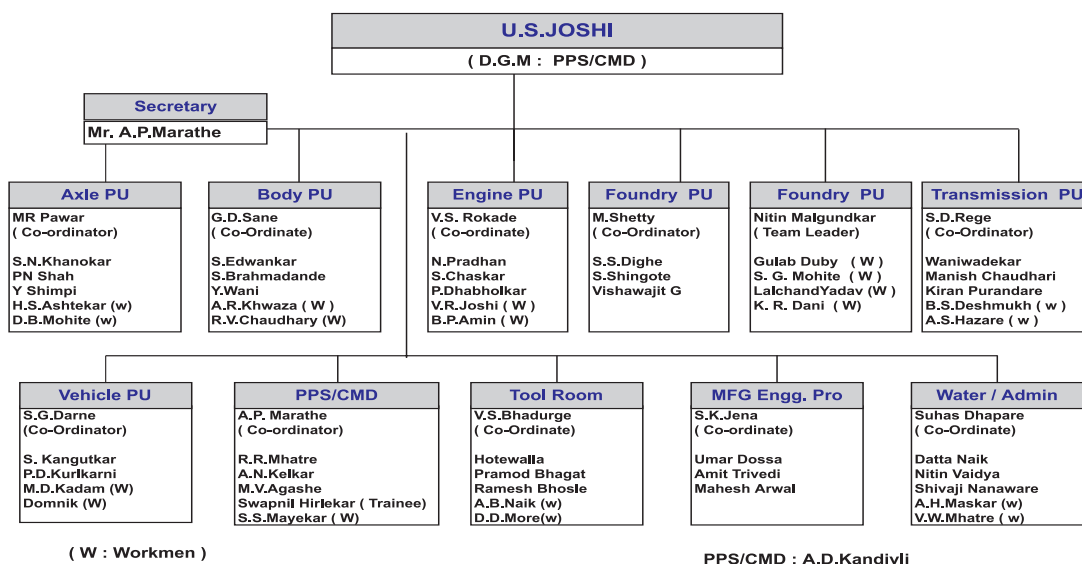
Energy Management Policy

- 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

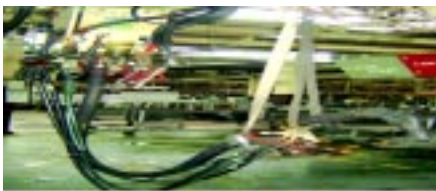
and increased upto 100 psi by Air Booster only near the m/c

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

2. Elimination of Baking operation for Cylinder head by using Cold setting Glue .



Before : Hot Setting Glue

More energy consumed in vertical oven for Cyl Head Assy baking Operation.

Baking time :-100 Min.

Baking Temp:-200 Degree C.



After : Cold Setting Glue

Changed in process resulted in elimination of baking Operation. Replaced Cold setting gum with Cold setting glue.

Saving :-Electrical 17142 KWH / Year.

PNG :- 55152 Kgs/Year

Total saving :- Rs.6.00 Lakhs /Year

e) Water Conservation

1. Rain Water harvesting in Engine testing pond.



Use of Rain water instead of Municipal water in rainy season.

Provided pipeline from shop floor roof to Engine testing pond along with filter to avoid contamination of water.

Annual saving =30 days x10 kl per day x Rs 40

Saving : 300 KL

: Rs. 0.12 Lakhs / annum.

2. Softening of bore-well water and used for sand cooling in Foundry.



Before- Municipal water used for sand cooling in Foundry PU.

Qty. 1440 KL / annum

Cost :- Rs. 0.56 Lakhs / annum

Hardness of water:- 40 ppm

After- Borewell water is used for sand cooling after being treated in softening plant.

Qty. 1440 KL / annum

Cost :- Rs. 0.20 Lakhs / annum

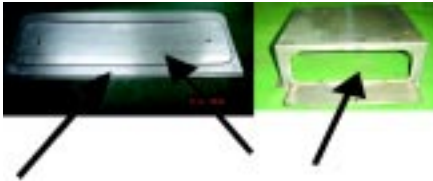
Hardness of water:- 6 ppm

Total saving : Rs. 0.36 Lakhs / annum.

F) Waste Management

1. Made Tool box from Windshield panel Cut out scrap (Scrap Cut out recycled to make smaller part)

Steel cutout of 5.34 Kg is generated in Windshield panel cutting operation



Before : Cut out from Windshield panel is sold as scrap.(1400 mm x 405 mm)

After : Cutout recycled to make smaller parts like tool box.

Scrap weight reduce from 5.34 Kg to 0.34 Kg

Saving : Rs 1.01 Lakhs per Annum.

2. Molding Of Paving Blocks From Foundry Waste



Foundry Waste consisting of Iron, Nickel , Manganese etc. was disposed earlier.

Presently mixed with cement and other concrete aggregates to make paving blocks used for road repairing.

Benefits:-

- Utilization of waste material.
- Increased compressive strength of blocks upto 30 N / sq.mm
- Cost of paving blocks from Rs. 30 / sq. feet to Rs. 18 / sq. feet.
- Disposal cost avoided.

Used for road repairing in other plants.



3. Oil Extractor for Recovering Oil From Chips



Before : Chips with oil wasted.

After : Provide Oil Extractor for Separating the Oil From Chips

Oil Recovery 180 Liter per day = Total Saving Rs. 4.0 Lakhs / Year

G) 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.

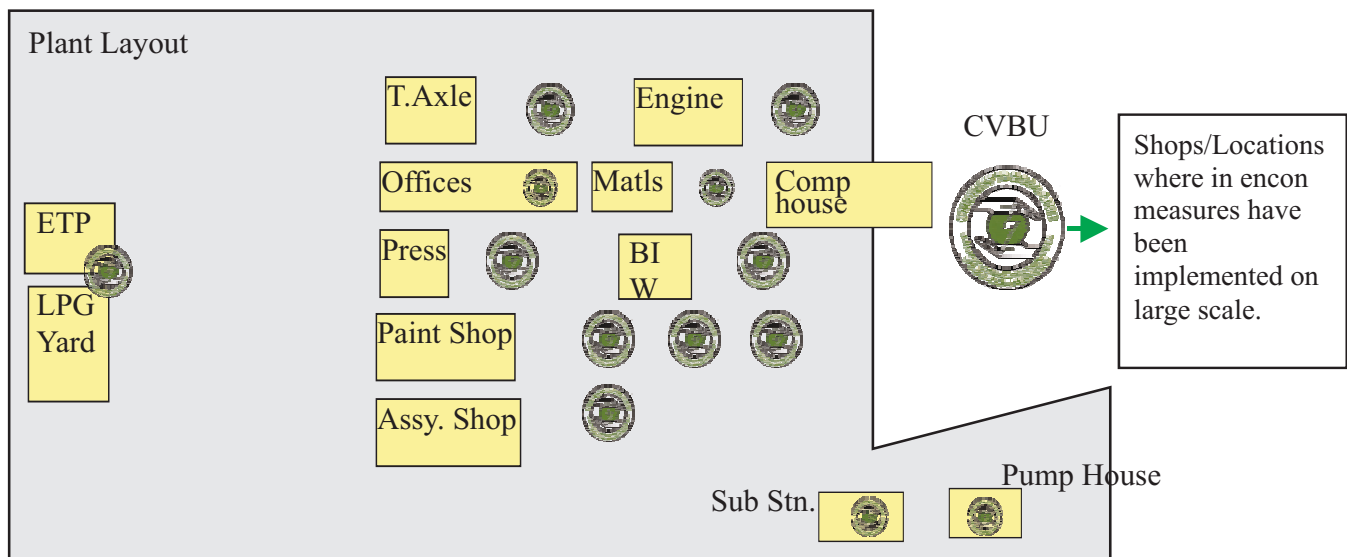
TATA MOTORS LIMITED

Passenger Car Business Unit, Chikhali, Pune (Maharashtra)

Unit Profile

Tata Motors, one of India's largest private sector companies, is the leading commercial vehicle manufacturer with significant presence in the multi-utility and passenger cars segments. The company has an annual turnover of over Rs 80 billion. The Passenger Car division was born out of a vision to offer the Indian customer all the comfort of a big car, at the price of a small car. The widely successful Tata Indica, a Euro 2 compliant vehicle, is the country's first indigenously designed, developed and manufactured passenger car. In December 2002, the company launched the Tata Indigo, a sedan. It also makes several other passenger vehicles, including the Safari, Sumo and Sierra. Tata Motors has a strong client following not only in India but also in the Middle East, Asia, Africa, Australia, Europe and America. The company has manufacturing plants at Jamshedpur, Pimpri and Chinchwad near Pune, and Lucknow in UP.

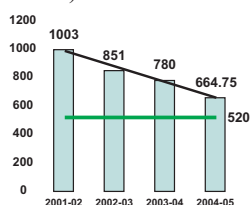
Spread of Plant	- 178 acres.
Production Level	- 126005 Units (2003-04)
Total turn over	- Rs. 2478 Crores
Total shop Sub-stations	- 27 Nos.
Total connected load	- 65 Mw.
Maximum demand	- 15 MVA



Energy Consumption

Year	Annual Energy Consumption					Production (Units)	Specific Energy Consumption		
	Electrical		Thermal				Electrical	Thermal	
	Kwh (Million)	Rs (Million)	Fuel Type	Tons/KL	Rs (Million)			Kwh/Car	Kg/Car
2000/01	54.86	234.6	LDO	673	9.9	46720	1174		14.4
			LPG	2086	47.37			45	
2001/02	64.73	262.46	LDO	828	14.7	64541	1003		12.82
			LPG	1841	31.2			28.52	
2002/03	69.72	282.69	LDO	1052	16.4	81892	851		12.84
			LPG	2141	35.7			26.14	
2003/04	98.72	399.8	LDO	768	12.3	126005	780		6.09
			LPG	3084	52.4			24.47	
2004/05	113.53	381.7	LDO	578	13.1	170800	664.75		3.38
			LPG	4387	100			25.68	

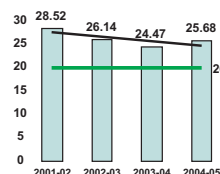
Car Plants Electricity Consumption (Kwh/Car)



'Encon' Initiatives, 2004-05

- No significant addition to connected load during capacity expansion
- Down sizing and Installation of energy efficient motors
- Installation of Variable Frequency Drives for variable loads
- Installation of energy efficient lighting schemes

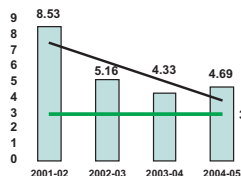
Car Plants LPG Consumption (KG/Car)



'Encon' Initiatives 2004-05

- Thermography Audits
- Reduction of non useful mass in baking ovens and furnaces
- Use of cleaner fuels for Paint Shop burners
- Combustion efficiency enhancement by optimisation of Air to Fuel ratio

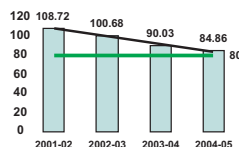
Car Plants Water Consumption (Cubic Meter/Car)



'Encon' Initiatives 2004-05

- Rain Water Harvesting
- Recycling of Paint Booth Water
- Leak detection and prevention programme

Car Plants Compressed Air Consumption (Kwh/Car)



'Encon' Initiatives 2004-05

- Need based operation of PCBU/CVBU Compressors
- Leak detection and prevention programme

Energy Conservation Commitment, Policy and Organizational Set up

Energy Policy

Tata Motors are committed to optimum use of Energy and Fuel.

1. By using Energy Efficient Alternatives, methods and Eco-friendly Technology, by adopting diligent & effective maintenance & work Practices to ensure quality & reliable supply.
2. To minimize and eliminate the wastage in every segment of operations.
3. To make an effort to continuously reduce the cost of service by adopting effective “Energy Management System”.

Environment Policy

ENVIRONMENTAL POLICY

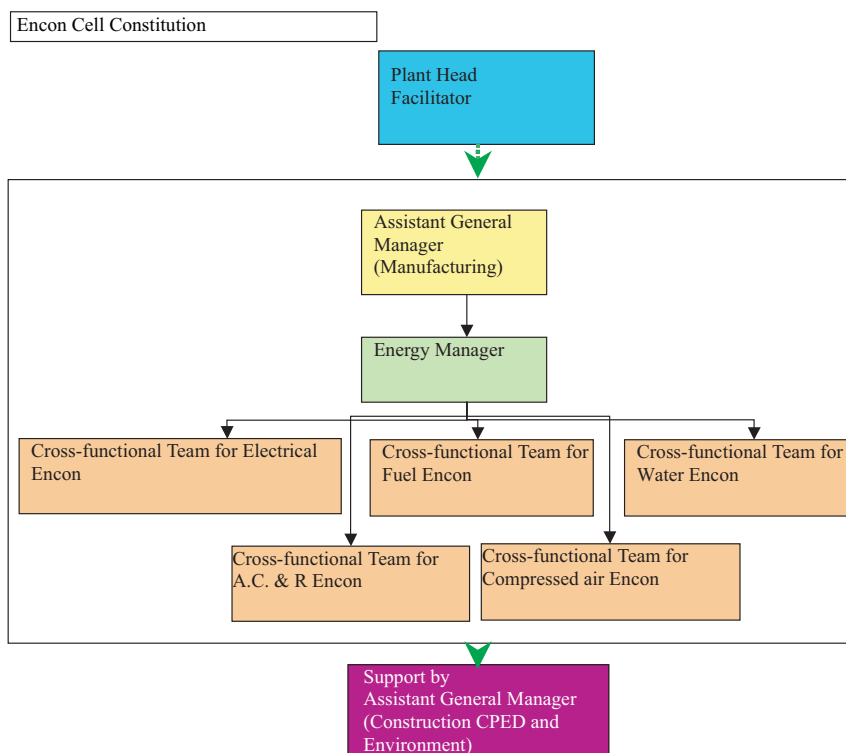
TATA Motors reaffirms its commitment to minimize the adverse impact of its products, operations and services on the environment.

Towards this end, it shall strive to:

- Establish sound environment objectives and targets & a process of reviewing them.
- Comply with all applications legal / regulatory & other Environment requirement.
- Reduce the emission levels of vehicles in full compliance of the regulatory norms & proactively work with the industry, Government, other related industries & agencies to bring in international practices.
- Use of environmentally sustainable technologies & practices for prevention of pollution and the continual improvement in environment performance.
- Conserve natural resources and energy by minimizing their consumption & “wastage.
- Minimize wastage generation, enhance recovery & recycling of material and develop Eco-friendly wastage disposal practices.
- Building awareness of our work force, customers and vendors on Environment issues.

This policy is communicated to all our employees and made available to public / stake holders on request.


Ratan N. Tata
Chairman 2001



Energy Conservation Achievements

Passenger Car Business Unit bagged 'Excellent Energy Efficient Unit Award' consecutively for 2001-02 and 2002-03 at National Level competition organised by Confederation of Indian Industries (CII) along with 'Most Useful Presentation Award' for 2002-03. Unit received CERTIFIC ATE OF MERIT AWARD, for 2003-04 from BEE at the hand of Honorable Prime Minister of India Dr. Manmohan Singh.

Encon Details

	Year	Encon Projects Implemented (Nos)	Investment Made (Rs Lakhs)	Savings Achieved (Rs Lakhs)	Specific Consumption		
					Electricity KWH/Car	LPG Kg/Car	LDO Litres/Car
	1999-00	11	334	1055	1387	47	16.76
	2000-01	33	61.5	244.2	1174	45	14.44
	2001-02	28	6.6	119.9	1003	28.5	12.82
	2002-03	33	100	124.7	881	26.1	12.84
	2003-04	25	554	297.7	780	24.5	6.09
	2004-05	08 (Technology Up gradation)	13680.34	807.93	664.75	25.68	3.38

Major Encon Projects Implemented during 2004-05

1. Installation of Energy Efficient Motors

Location: Paint Shop Air supply Units and Humidification Pumps

Project Duration: Sept 2004 to March 2005

Project Description: Down sizing and Installation of Energy efficient Motors at 21 different applications

Savings Achieved: 1995 Kwh/day (I e 3 Kwh/Car for production of 650 Cars/Day) (As a result of matching of motor rating to the load and use of High efficiency Motors)

Investment : 60 Lakhs Pay back period: 2.5 Years (Annual saving of 2464323)



2. Reduction in specific consumption of all energy elements by cycle time improvement

Location: All processes in Paint Shop

Project Duration: April 2004 and Dec 2004

Project Description: Installation of Robots and replacement of conveyors for enhancement of through put time in Paint Shop

Savings Achieved: 18200 Kwh/Day (I e 28 Kwh/Car for 650 Cars/ day)

Investment made: 5400 Lakhs (Capex budget for 750 Cars/day)

Payback period: 2 years



Robotic Painting to reduce cycle to 67 seconds from earlier 86 seconds



3. Installation of single parabolic dark light reflectors

Location: Canteen, Conference halls and offices

Project Duration: Nov 2004 and Dec 2004

Project Description: Conversion of 2*40 W tube lights to 1*40 W tube lights keeping the illumination level constant with the use of high efficiency tube light reflectors

Savings achieved: 120 Kwh/Day (I e .16 Kwh/Car for the production level of 650 cars/Day)

Investment made: 34 Lakhs

Payback period: 25 years

4. Underbody spray application (Manual) at Paint Shop

Situation Before (A)

- Manual Operation
- High amount of air supply and Exhaust was required to minimize the over spray and to provide comfort to the operator
- Painters were required to go underneath of the cab to perform the operation, making it highly unsafe



Energy Conservation through low cost automation (B)

Underbody spray application (Automatic) at Paint Shop

Encon Measure implemented

- Designed and installed a low cost under body spray machine from salvaged machine components

Benefits achieved

- Elimination of manual work and thereby over spray and comfort requirements
- Reduced motor pulley diameter from 300 mm to 242 mm and switched of 2# 30 Kw Exhaust blowers
- Improved ergonomics



Net Saving Achieved 420000
Kwh/annum

Energy Conservation: Break through Improvement through Robotic Painting (C)

Electrical Savings: One 30 Kw exhaust fan switched off

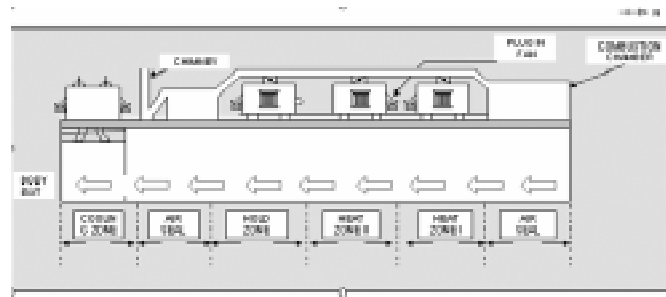
Break through savings: Cycle time reduced to 46 seconds from earlier 86 seconds (Investment: 12.5 Millions)



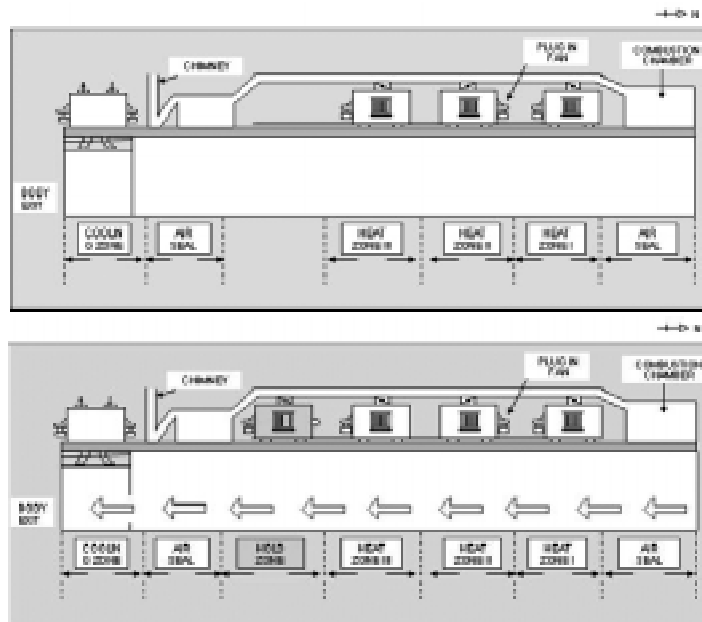
Under Body 03-MPG

4: Enhancement in Energy Efficiency through Capacity Enhancement

Paint Shop Baking Oven (Situation before: 42 JPH)



Paint Shop Baking Oven: Modifications to suite it for 54 JPH without significant addition in connected



Capacity Enhancement by 28 %, by mere increase in LPG consumption by 14% and Electricity consumption by 1%

Energy Conservation Plans and Targets

Energy Conservation Measures (Planned)	Anticipated savings IN		Approx. investment (Rs. lakhs)	Project Commencement & Completion year
	Energy Value (specify units)	Rs. lakhs		
1) Conduct Third Party Energy Audit	400000 Kwh	16.2	20	2005/2006
2) Extensive use of Thermography audits for arresting heat energy loss.	180000 Kg (LPG) 6000000 Kwh	36	Investment already made in 2004/05	2005/2006
3) Implementation of various cycle time reduction projects.	300000 Kg (LPG)	303	Investment already made in 2004/05	2005/2006
4) Installation of Asian E Tube lights	1600 Kwh	0.07	1	2005/2006
5) Implementation of various power supply quality enhancement measures with the help from Harmonic analysis	180000 Kwh	7.29	1	2005/2006

ENCON TARGETS

Year	Electrical*	Thermal*	Reduction over the year 2003-04	
			Electrical%	Thermal%
2004-05 (Base year)	664 Kwh/car	26 Kg/Car	-	-
2005-06	531 Kwh/car	21 Kg/Car	20%	20%
2006-07	425 Kwh/car	17 Kg/Car	40%	40%

Environment and Safety

Tata Motors has led the Indian automobile industry's anti-pollution efforts by introducing cleaner engines. It is the first Indian company to introduce vehicles with Euro II norms and I. Its joint venture with Cummins Engine Company, USA, in 1992 was a pioneering effort to introduce emission control technology in India.

Tata Motors has set up effluent treatment facilities to avoid release of polluted water into the environment. In Pune the treated water is conserved in lakes that attract various species of birds from around the world, thus turning the space into a green belt.

The company's endeavors in environment protection include soil- and water-conservation programmes and extensive tree plantation drives.

TATA MOTORS LIMITED
Jamshedpur (Jharkhand)

Unit Profile

Tata Motors, which is India's only fully integrated automobile company with multi-location plants, has product offerings spanning Medium and Heavy Commercial Vehicles, Light Commercial Vehicles, Multi-Utility Vehicles and Passenger Cars. The Commercial Vehicle Business Unit (CVBU) of Tata Motors is India's largest and world's sixth largest commercial vehicle manufacturer. Enjoying nearly 60.4% overall market share in commercial vehicle sector the company had a turnover of Rs. 20483 crores during 2004-05. As an important part of CVBU of Tata Motors, the plant at Jamshedpur manufactures Medium and Heavy Commercial Vehicles from 7 to 40 ton gross vehicle weight. Having an installed capacity of 60,000 vehicles, the plant produced 83035 vehicles during the year 2004-05 to meet the buoyant demand in commercial vehicle industry. Having acquired the Daewoo Commercial Vehicle plant at South Korea and Hispano Carrocera, a reputed bus manufacturing company in Spain, Tata Motors is set to expand its product range and presence in international market substantially. Also, integrating its interventions of Six-sigma, Kaizen, TPM, WCM, ICR and ISO/TS 16949, the unit is set to become a global player to reckon with.

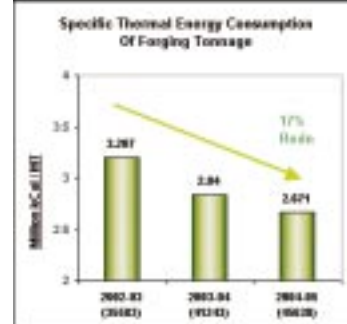
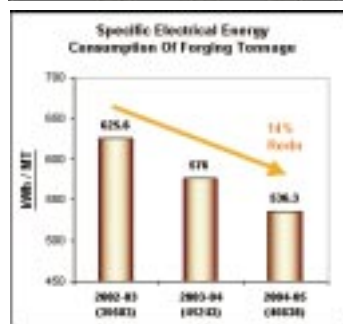
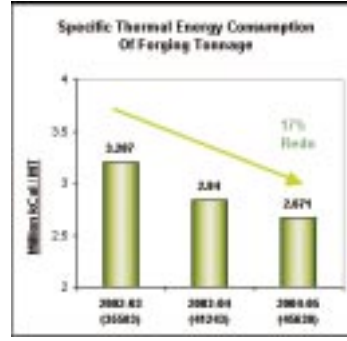
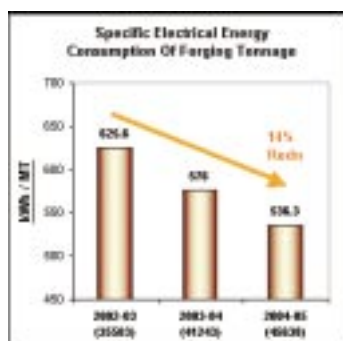
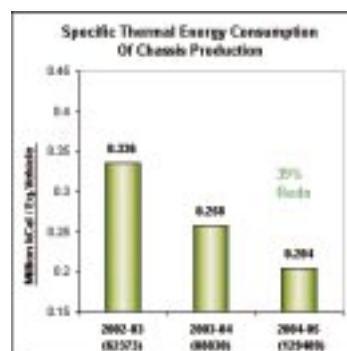
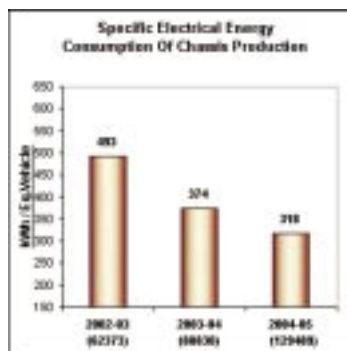
The Automobile unit at Jamshedpur has captive Forge and Foundry divisions which meet its requirement of all critical steel forgings and alloy iron castings. The unit also has a decent township for its employees and supports community services as a part of its social responsibility towards its employees and local community.

Energy Consumption

Energy Conservation measures are implemented systematically and the Specific Energy Consumption of all areas - Auto, Forge and Foundry divisions has been consistently declining. Also Energy Cost as % of Manufacturing Cost has come down. This resulted in saving of Rs 7.60 crores in energy during 2004-05. Last three years' specific energy consumption figures are as shown below:

PRODUCT	DESCRIPTION	UNIT	2002-03	2003-04	2004-05
Automobile chassis	Electrical energy	KWH / Eq. Vehicle	493	374	318
	Thermal energy	MkCal / Eq. Vehicle	0.337	0.258	0.204
Forge Tonnage	Electrical energy	KWH / MT	626	576	536
	Thermal energy	MkCal / MT	3.21	2.84	2.67
Casting Tonnage	Electrical energy	KWH / MT	1926	1790	1688
	Thermal energy	MkCal / MT	0.323	0.302	0.295
Manufacturing Cost		Rs. Lakhs.	237179	304141	453377
Total Energy Cost		Rs. Lakhs.	8083	8373	8985
Energy cost as % of Manufacturing Cost		%	3.41%	2.75%	1.98%

Steadily declining Specific Energy Consumption



Energy Conservation Commitment, Policy and Set up

Energy Conservation and energy efficiency in all operations is a Top Management priority for the unit and an Energy Policy is in place. An Engineering Audit group headed by certified Energy Manager co-ordinate the energy conservation activities in the plant.

Awareness & involvement of people at all levels has been a major plank for implementation of energy conservation measures. **Energy auditing** is a function of the Engineering Audit group. Every year **Targets** are set for the various divisions & **Energy Conservation Action Plans** are worked out. The Specific Energy Consumption & status of action plans is reviewed weekly with divisional coordinators using a *common matrix* which is shared across all divisions and areas to facilitate *cross-pollination of ideas*. Ideas implemented by groups are encouraged by publication in in-house magazine 'Flashes'. The Team set-up and a sample leaves from in-house magazine are also attached.

Specific consumption of each area is monitored by Engineering Audit on daily basis & is shared with each Divisional Head / divisional Coordinator as well as the Top management. The group also maintains an 'EnergyWeb' on the intranet for use by all employees for reports and analyses.

ENERGY POLICY

We, at Tata Motors are committed to optimum use of all forms of energy by:

- Using energy efficient alternatives, methods, work practices and eco-friendly technologies.
- Minimizing and eliminating wastages in all segments of our operations.
- Creating awareness on energy conservation amongst employees at all levels and using effective Energy Management system for reducing energy consumption and its cost.
- Using renewable energy sources where feasible.

Sep. 20, 2004



A P Arya
Sr. Vice President
Jsr & Lkw Works



Energy Conservation Projects

Installation of Medium Frequency furnace for melting



A Medium Frequency furnace for melting iron has been installed. Improved design for charging, reduced de-slagging time and reduced melting time has reduced energy consumption.

Before Installation: Energy Cons 646 kWh / MT of molten metal

After Installation: Energy Cons 540 kWh / MT of molten metal

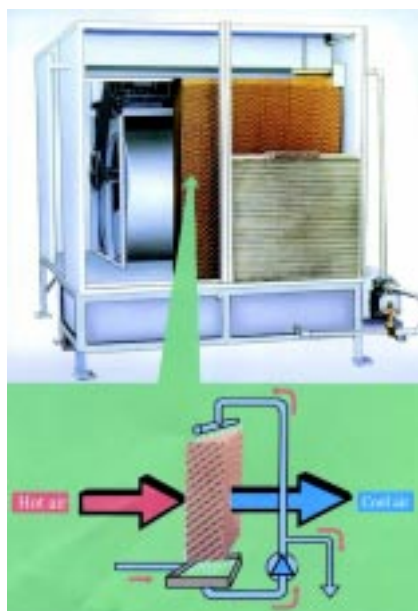
Savings Achieved	: Rs 105 Lakhs per annum
Investment	: Rs 330 Lakhs
Payback	: 38 Months



Installation of Energy Efficient Weishaupt Burners

Use of fuel efficient Weishaupt burners with modulating regulation has been made in three more ovens in Centralised paint shop. This has resulted in saving of 144 KL of LDO per year.

Energy cost saving	: Rs 25.9 Lakhs per year
Investment	: Rs 24.0 Lakhs
Payback Period	: 11 months



Celdek Pad in Air Replacement Plant in Paint shop

Celdek Pad in place of high pressure water spray jet system has been installed in ARP Nos 3 & 4 also thereby reducing the size of pump from 11 kW to 1.5 kW and saving electrical energy.

Earlier consumption	: $2 \times 11 \times 0.88 \times 16 = 282$ kWh per day
After change, consumption	: 39 kWh / Day
Annual Energy saving	: 1.46 Lakh kWh
Annual saving	: Rs 5.33 lakh
Investment	: Rs 8 Lakhs; Payback: 18 months

Rad-Heat Gas Heating in place of Electrical in 3 Ovens

Remaining 3 Ovens for coating sand heating in Shell core shop in Foundry which earlier had 90 kW electrical heater each, have been replaced by Radiant Heat Gas heating system.

Earlier energy consumption	: 1112 kWh/Day each
Now, LPG consumption	: 88 kg/Day each
Annual savings elect. Energy	: 8.61 Lakh kWh
Net Saving in energy cost	: Rs 18.48 Lakhs
Investment	: Rs 17.7 Lakh
Payback period	: 11 months



Control Air system for Compressed Air in Outer Complex

ControlAir systems for demand side pressure management of Compressed Air in 5 more areas in Outer Complex has resulted in reduced pressure requirement by 4-8 psi in different user shops due to less than 1 psi variability.

Energy consumption reduced by 1967 kWh/Day

Energy saving	: 6.0 lakh kWh / Year
Annual saving	: Rs 21.90 Lakhs
Investment	: Rs 20 Lakhs
Payback period	: 11 months

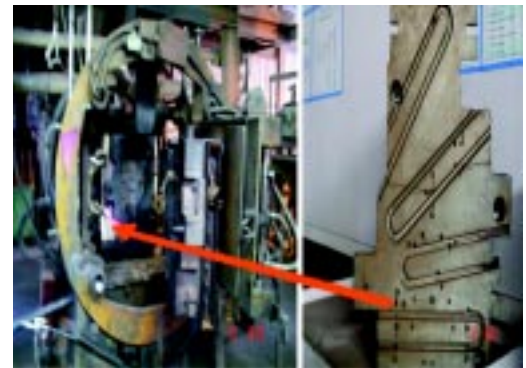


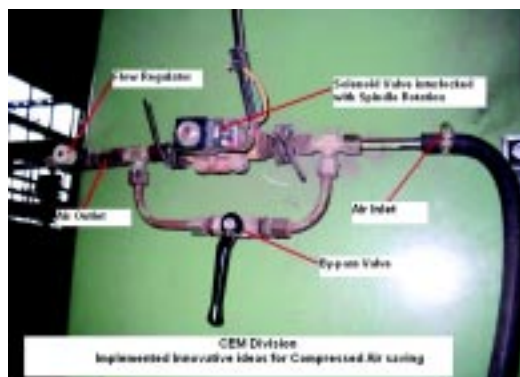
Modification of Core box and elimination of intermediate heater plate

In shell core machine core box was mounted on heater plate and heat was transferred from heater plate to core box. In 2004-05, the Core box for new 6BT was modified to eliminate the heater plate & thereby reducing the wattage of heating elements.

Earlier	: 9 kW + 2 x 1.92 kW = 12.8 kW
Now	: 4 x 1.92 kW = 7.6 kW

Annual saving: Rs 12.78 lakhs for 6 machines





Use of Solenoid operated valves for controlling compressed air

Solenoid operated valves interlocked with machine spindle running were installed on 6 CNC machines at the initiative of men on shop floor so that compressed air is saved during non cutting cycle. 44 kWh/Day of energy in compressed air was saved for each machine.

Annual saving was 79000 kWh amounting Rs 2.78 lakh at an investment of Rs 0.15 lakh

Payback period : 1 month

Besides the above, other projects implemented during 2004-05 are:

- ★ Optimizing temperature in Chilling plants for Paint kitchen and CED paint setup in CPS.
- ★ Change-over to lower wattage energy efficient lamps for lighting in the plant & improved luminaries and circuit & control.
- ★ Low cost automation using timers, interlocking, solenoid valve etc for saving energy.
- ★ Use of VFD's at 3 more locations for flow control of pumps and blowers and saving energy.
- ★ Systematic Kaizen exercises, improved work practices and improved hearth loading and scheduling resulting in reduced shift running of production lines & certain equipment.
- ★ Use of Del-star converters in fluctuating-load, and permanent star connection for under loaded motors at 3 spring setting machines.
- ★ Replaced metallic blade Fans by energy efficient FRP blades for Man-cooler.
- ★ Reduced thermal losses in Furnaces and Ovens by improved insulation / recuperators.
- ★ Further 60 more translucent roof sheets were installed in different areas to harness natural day light in place of using high-bay lamps during day time.
- ★ Technical improvements in process in various areas for reducing energy consumption.

Energy Conservation Plans and Targets

Jamshedpur unit of Tata Motors is committed to further improve its energy performance by exploring new avenues for energy saving on a continuous basis. Some of the major proposals as a part of future plan for achieving targets in energy conservation are:

- (1) Installing and commissioning one more Medium Frequency Induction furnace in Foundry so that old normal frequency furnaces are completely phased out for saving in energy.
- (2) Installing high capacity machine and enhancing Cold Box core making capacity and reduce dependence on power intensive shell core machines.

- (3) Installing VFD's in Engine Cooling Tower , Stage I degreasing and other identified areas to save power.
- (4) Continuing with phased installation of Translucent roof sheets for day lighting in identified areas.
- (5) Installing Celdek pad in place of water spray in remaining Air Replacement plants in CPS.
- (6) Installing energy efficient billet induction heating, replacing old inefficient R/H furnace.
- (7) Continuing with phased Conversion of existing metallic blade to FRP blade for man-coolers .
- (8) Installing smaller size Energy efficient screw compressors for ensuring better capacity matching during different times of the day.
- (9) Converting 2000 lb electrical heat treatment furnaces into thermal heating.
- (10) Trying alternative fuels for reducing energy cost and improving environment.

Environment and Safety

In line with the Environment Policy of the Company the Jamshedpur unit has a full-fledged department to monitor and coordinate the safety and environment aspects. The Plant and the Town services have been certified to ISO 14001 Environment Management System. A major Centralized Effluent Treatment Plant has been set up. Treating and recycling of water has helped reduce water consumption from 13.31 to 11.74 cu.m per Eq. Vehicle produced during 2004-05.

Besides, Centralized Paint Shop has been converted from AED to CED in June, 2003 reducing the effluents substantially. Also a Rainwater Harvesting project at an investment of Rs 3 crores has been under taken in the current year.

TATA JOHNSON CONTROLS AUTOMOTIVE LIMITED
Hinjewadi, Pune (Maharashtra)

Unit Profile

TJC was established in January 1996 as a 50:50 joint venture between Tata Auto Comp Systems Limited (TACO) and Johnson Controls Inc (JCI) to provide World class seating systems in India.

- TACO is a holding company founded to create JVs with global Auto Component leaders to supply high quality Auto components in keeping with the Tata Groups vision of producing World class Passenger cars and Commercial vehicles.
- JCI (US Fortune 71 Company) is a leader in Automotive Seating and Interiors with a turnover of USD 26.6 Billion (FY-2004) and over 290 manufacturing locations worldwide.

Energy Policy

Tata Johnson Controls Automotive Limited believes that energy saved is energy generated.

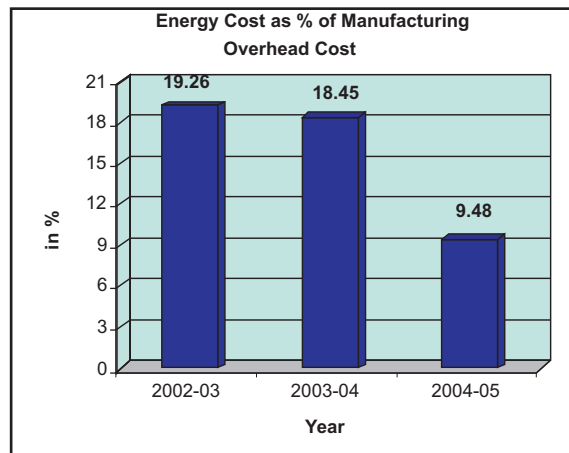
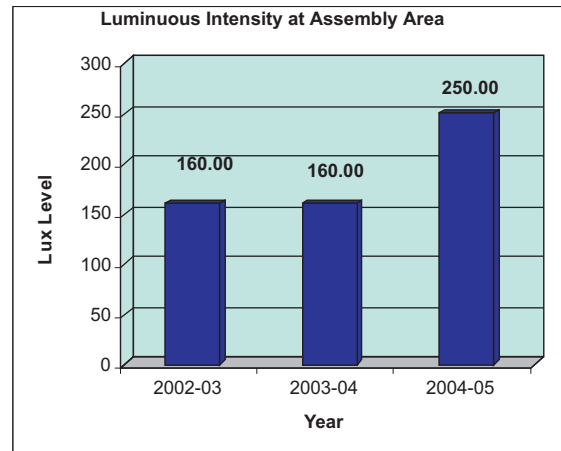
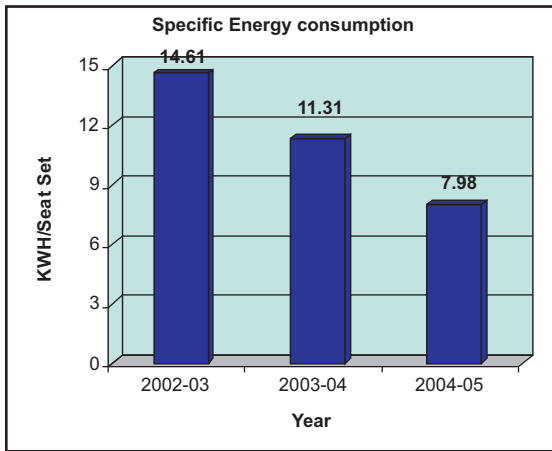
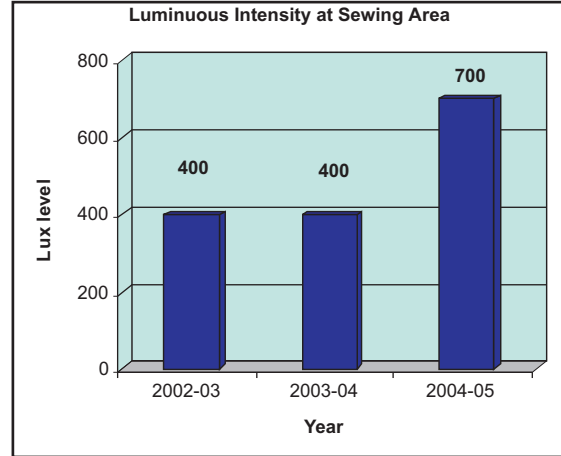
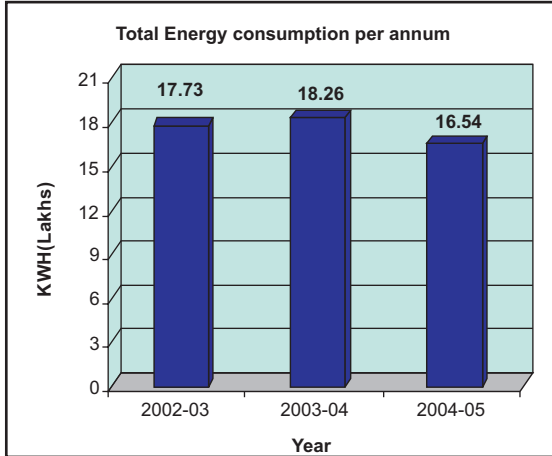
We are committed to conserve available energy resources in the organization by promoting:

- Optimum utilization of available energy.
- Use of safe, energy efficient & eco-friendly technology.
- Possible use of renewable energy resources.
- Continual improvement in energy conservation.
- Employee awareness and involvement in energy conservation initiatives.

Energy Consumption

SPECIFIC POWER CONSUMPTION DETAILS	UNIT	2002-03	2003-04	2004-05
Total Annual Dispatch	Seat Set	121304	161345	207373
Total Energy consumption per annum	Kwh (Lakhs)	17.72740	18.26089	16.54341
Total Manufacturing Overhead cost	Rs.Lakhs	407.05392	412.35712	721.23439
Total Energy cost	Rs. Lakhs	71.75847	76.84354	66.04097
Energy cost as % of Manufacturing Overhead cost	%	19.26	18.45	9.48
Electrical units consumption per Seat Set	Kwh	14.61	11.31	7.98

Graphical Representation of Energy



Energy Conservation Commitment Policy and Set up

Salient Features of Energy Conservation Cell

The unit has Energy Conservation Cell at Pune plant, headed by Energy Manager and supported by Cross Functional team of Senior Executives in various departments.

Energy Manager is one of the key members in Plant HSE&E Committee and Cross Functional Team. The Consumption of Energy and progress of Energy conservation projects are reported in these committees for review. This report becomes a part of Management Review by CEO.

Energy conservation cell adopts new energy efficient technology, processes and focuses on minimizing waste. Appropriate training and involvement of employees in energy conservation are creating employee awareness. Employee involvement for these initiatives can be seen through Employee suggestion scheme and other employee participation drives in the organization.

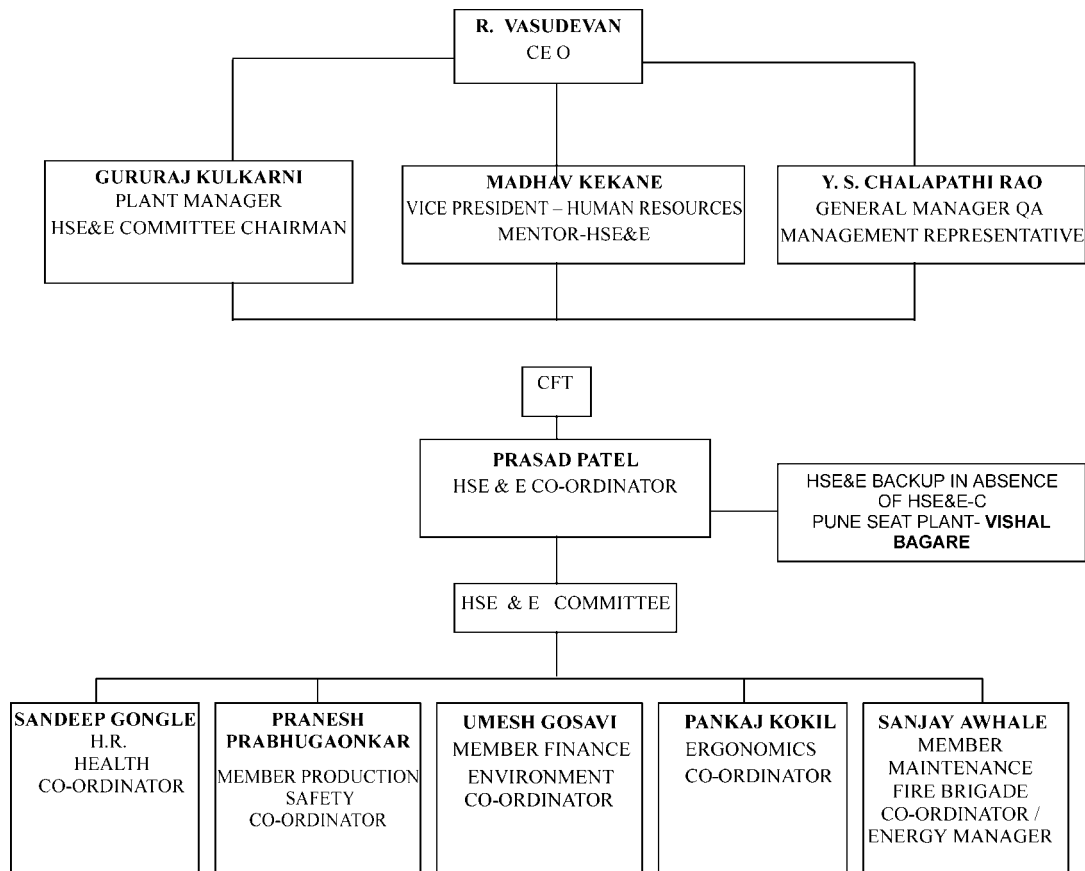
For effective implementation and results, cross-functional team discusses and brainstorms on various ideas.

Various Tools used by the Team for this purpose include:

- 1) Six Sigma
- 2) Kaizen
- 3) Suggestion scheme
- 4) Knowledge sharing with Johnson Controls world wide.
- 5) Benchmarking with Industry best.
- 6) Training & Awareness for employees.
- 7) Process analysis & monitoring.

All efforts are directed towards achieving companies' strategic objectives, which include reduction of costs and overhead expenses minimum by 5% over the previous year.

Energy Conservation Cell Structure



Energy Conservation Achievements

Tata Johnson Controls Automotive has implemented many energy conservation projects and ideas. Following are the energy conservation achievements.

- 1) Electrical heating in steamer application is substituted by solar water heating system.
- 2) Electrical heating in canteen application is substituted by solar water heating system.
- 3) Reduced 40% electrical units consumption in Illumination of Manufacturing block by reducing the height of tube light fixture from 6.6 mtrs to 3 mtrs.
- 4) Increased the lux level on the working area from 160 lux to 250 lux.

Energy conservation in various areas also aided in achieving following awards.

- 1) Johnson control Worldwide Gold Award for HSE & E for the Year 2004
- 2) ACMA Bronze Award for the Year 2004

Major Energy Conservation Projects Implemented During The Year 2004-05

1) Installation of Solar Energy Water Heating System

BEFORE



Electrical heating for canteen hot water

AFTER



Solar Energy Water heating for canteen hot Water

Before: Electrical heating used for increase the water temperature for clean the plates, glass etc and keeping the food hot in hot case. No control for water temperature.

After: Installed Solar Energy Water Heating system for increase the water temperature for clean the plates, glass etc and keeping the food hot in hot case. From this system maintain the temperature between 55 Deg cel to 60 Deg cel.

Capacity of the system	: 2000 LPD.
No. of. Solar Collector	: 16 Nos.
Outlet Water Temperature	: 55 Deg cel – 60 Deg cel
Total Electrical Energy Units saved per annum	: 0.39650 Kwh (Lakhs) .
Total Electrical cost saved per annum in Rs.	: 1.586 lakhs.
Total Investment for project in Rs.	: 1.85 lakhs.
Pay Back Period	: 356 Days.

2) Provided Glass Windows on wall in passage area for Natural Light.

Before: Manufacturing block passages 4 x 36 watts type 20 nos. tube lights were **ON** in day time.

After: Provided Glass windows on wall for natural light in passage area in daytime. Reduced the electrical units consumption in daytime.

Total Investment in Rs.	: 0.45 lakhs
Total Electrical Units Saved per annum	: 0.08784 lakhs
Total Electrical cost saved per annum	: 0.35136 lakhs
Pay Back Period	: 391 Days.



3) Installation of Solar Energy Water Heating for Steamer.

BEFORE



Electrical heating for generation of steam

AFTER



Solar water heater for preheated water inlet to Steamer.

Before: In plant electrical steamers are used for generation of steam from water at 120 deg Celsius. Initially by using of 3 x 7 watts electrical heaters increase the water temperature from atmosphere say 35 deg cel to 120deg cel. An electrical heater ON time was 18 minutes in one hour.

After: Installed Solar Energy Water Heating System for increase of the water temp from atmosphere temperature to 85 deg cel. It gives the preheated water inlet to steamer. From these electrical heaters ON time has reduced from 18 minutes to 6 minutes in one hour.

Capacity of the system	: 2000LPD.
No. Of . Solar Collector	: 24 Nos.
Outlet Water Temperature	: 80 – 85 Deg cel.
Total Electrical Units saved per annum	: 0.71675 Kwh (lakhs).
Total Electrical Cost saved per annum in Rs.	: 2 .867 lakhs.
Total Investment for project in Rs.	: 2.65 lakhs.
Pay Back Period	: 282 Days.

4) Overhead structure for reduce the tube light fixture height.

BEFORE



AFTER



Before: Manufacturing block tube light fixtures were on 6.6-meter height. Details of the electrical load and lux level in the respective area are as follows.

Total electrical load in kilowatt = 21.024

Name of section	Type of Fixture	No. of. Fixtures	Load in kw	Lux level on working area
Sumo line	4 x 36	20	2.88	160
Safari line	4 x 36	36	5.184	160
Sewing Area	2 x 36	150	10.8	450
Cutting Area	4 x 36	15	216	160

After: Provided overhead structure for Manufacturing block tube light fixtures and reduced the height of fixtures from 6.6 meters to 3 meters. Details of the electrical load and lux level in the respective area are as follows.

Name of section	Type of Fixture	No. of. Fixtures	Load in kw	Lux level on working area
Sumo line	4 x 36	7	1.008	250
	2 x 36	3	0.216	
Safari line	4 x 36	9	1.296	250
Sewing Area	3 x 36	50	5.4	750
Cutting Area	4 x 36	6	0.804	250

Total electrical load in kW after modification = 8.784
Total investment for project in Rs. = 1.75 lakhs.
Total electrical units saved per annum = 0.59371
Total electrical cost saved per annum in Rs. = 2.37484
Pay Back Period = 223 Days.

Energy Conservation Future Plans and Targets

Energy Conservation Measures (Planned)	Anticipated savings		Approx. investment (Rs.lakhs)	Project Commencement & Completion year
	in			
	Energy Value (Specify units)	Rs. Lakhs		
Installation of High Efficient Energy Saver for Outdoor & office lighting	0.25193	1.00772	1.1	Installation of high efficient energy saver transformer for lighting load. From this Reduce incoming voltage from 230 volts to 205 volts. 20% saving in kwh consumption in lighting. Completion - oct-2005.
Installation of High Efficient Energy Saver for Manufacturing block lighting	0.366	1.464	1.75	Installation of high efficient energy saver transformer for lighting load. From this reduce incoming voltage from 230 volts to 205 volts. 20% saving in kwh consumption in lighting. Completion - Jan 2006.
Installation of Temperature sensor & controller for cooling tower pump.	0.08	0.32	0.05	In existing system cooling tower pump motor is continuous ON. By providing temperature sensor and controller cooling tower pump motor will be OFF when sump temp below 28 deg Celsius. Completion - Oct 2005
Installation of CFL lamp for sewing machine area	0.1952	0.7808	0.5	Replace the tube light fixture by CFL LAMP in Sewing Area. Completion - Dec - 2005.
Installation of Microprocessor based power factor relay.	NO	2.04	0.6	To improve the power factor from 0.99 to unity and reduction of MD KVA. Completion – sep - 2005
Improving efficiency of CNC Machine. Reduce a one shift.	0.8235	3.294	0.5	To Improve the efficiency of CNC machine by through six-sigma project. Completion - Jan 2006

Environment and Safety

TJC is an ISO 14001 and OHSAS 18001 certified Company. The Company has given high degree of importance to the Safety of Employees, the Plant, equipment and environment. The Company has a HSE&E Committee working right from 1999, which is headed by the Plant Manager. The Committee has drawn members from various Departments who meet once a month and deliberate on various issues and matters concerning Health, Safety Environment and Ergonomics. The Committee operates within the HSE&E Policy, framework, and JCI HSE&E norms of Business Operating Systems.

TJC also has a Cross Functional Team of HSE&E, which consists of senior executives of the organization. Chief of Quality Head of the Company who is supported by other members from various disciplines heads the CFT.

The Company focuses on creating awareness and train employees in HSE&E areas to ensure high degree of compliance to safety norms.

The Company has a record of no reportable accident in the last 3 years and has the distinction of winning various Merit Awards and Recognitions from JCI Chairman for excellent HSE&E performance.

The Company has been giving significant importance to the Environment and Social factors that may be impacted by Company's operations. Towards this end, TJC has published CSR – Corporate Social Report under the guidelines of Global Reporting Initiatives of United Nations and attained the distinction of being one of the 5 Companies in Tata Group to have included Tata Human Index in the CSR Report.