

Technical Paper - Issue # 29  
Automobile sector EC measures



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**PREFACE**

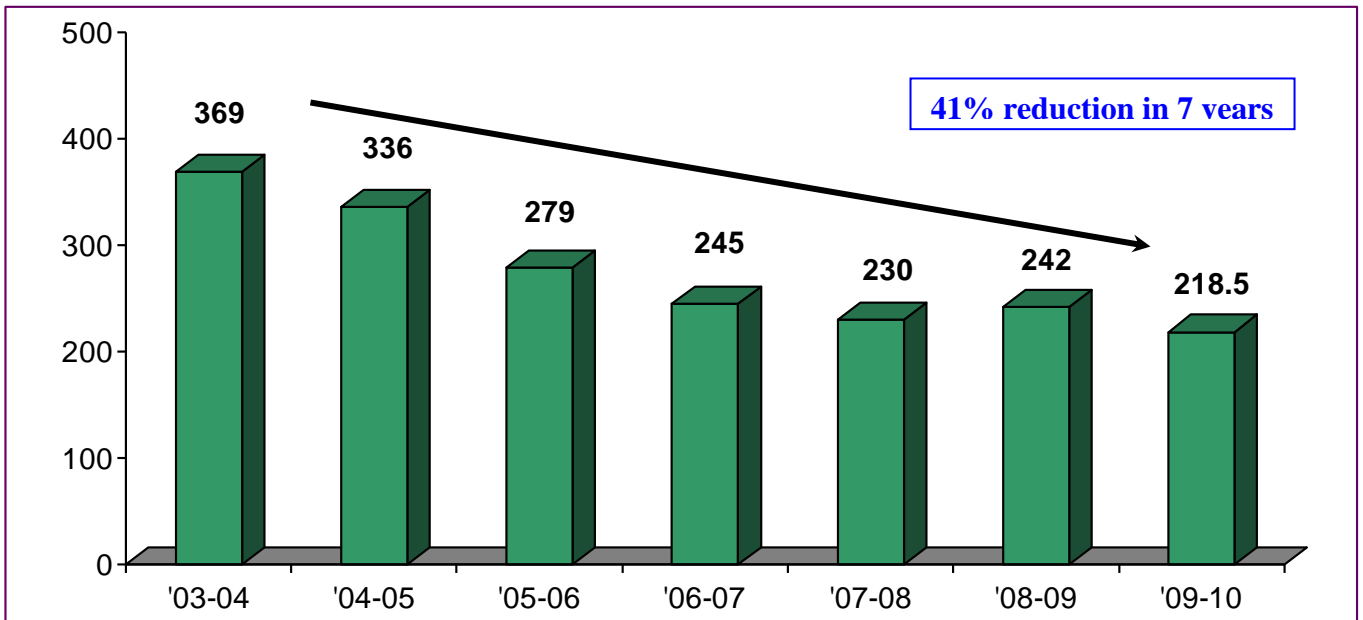
Ashok Leyland is one of the leading automobile manufacturers in India. Bhandara Plant is Gear Box Manufacturing unit having state of the art technology machine tools and furnaces and also modern manufacturing processes.

Electricity is one of the major resources having stake of 10-12 % of total operating costs. Data related to electricity consumed during last seven years is given in the table.

**POWER CONSUMPTION DATA**

#	DESCRIPTION	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10
1	Total Power Cost (Rs. Lacs)	619.17	626.2	817.00	1124.04	1123.49	741.17	763.48
2	Total KWH Units (Lacs)	179.06	193.22	245.46	271.89	268.51	171.35	174.66
3	Equivalent Gearbox Units	48587	57487	87866	110946	116364	70628	79923
4	Specific Power Cons(KWH / EGB)	369	336	279	245	230.8	242.6	218.5
5	Specific Power Cost (Rs./ EGB)	1274	1089	930	1013	965.49	1049.41	955.3

## SPECIFIC ENERGY CONSUMPTION TREND (KWH / EGB)



At Ashok Leyland Bhandara, energy conservation drive has been a way of life since long. Numerous projects have been implemented and the gains sustained year on year. The same is reflected in reduction of specific power consumption per Equivalent Gear Box. (Refer Trend Chart). Unit has received [State level award for Excellence in Energy Conservation and Management in 2008](#).

### Title of the Project

#### Energy conservation measures in Automobile Industries

**Automobile Sector Scenario:** Due to global economical melt-down, automobile industries suffered during Oct-08 to July-09. Production volume reduced drastically ranging from 30 to 70%, consequently financial performance has also affected. Many industries declared lay-offs to reduce their overheads. Though absolute energy consumption reduced but Specific Energy Consumption (SEC) i.e. energy consumption per unit of production (i.e. vehicle in case of automobile sector) has exponentially increased during this period.

The main reason for increase in specific energy consumption is under-utilisation of machines and furnaces due to reduction in capacity utilisation. For the production of small batches of components, high power consuming furnaces are to be put into operation and thereby KWH / Ton has gone up. Same was the case with air compressor system. In nut shell, fixed power consumption has gone up, resulted in increase of overall SEC.

**Analysis:** Please refer above trend chart, SEC in 08-09 is 242 KWH / EGB\* against 230 in 07-08 i.e. 5% increase. We analysed fixed and variable energy consumption vis-à-vis production on monthly basis. Our production volume reduced by 39.3%; overall power consumption reduce by 36.2% where as our variable power reduce by 41.4% but fixed reduce by 15.9% only. This had impact of 5% increase in SEC in 08-09. If above EC measures (to reduce fixed as well as variable power) would have not taken in time, SEC should have shoot up above 270 KWH / EGB i.e. 15-20% more as compared to 07-08.

Now demand for vehicle is increasing and subsequently production volume also. The EC measures initiated during 08-09 and also in past has started giving ROI, our SEC has come down to 218.5 KWH / EGB in 09-10 i.e. reduction by 13.2%. Similarly, reduction in power cost (Rs. / EGB) is also seen.

\* **EGB:** Equivalent Gear Box- Main product of our Unit is gear-box but considering other products like crown wheel/pinions & misc. spares, EGB is worked out by weighted average method

### Description of the energy conservation Projects:-

At Ashok Leyland Bhandara, EC measures are categorised as follows:

1. EC measures in Machine tools
2. EC measures in Heat Treatment
3. EC Measures at Plant level
  - Lighting system
  - Compressed air system
  - Reactive power Management
  - Power system Management like MD control, CD review, Connected load review etc
  - Renewable energy utilization
  - Latest technology utilization (Energy software)

Ashok Leyland Bhandara has declared this year as “Year of Energy Conservation” many more projects are in hand such as solar heating system, External energy audit, Turbo ventilators installation, Bio-gas plant etc. In the recent past many break-through EC projects are executed, which has resulted in reduction of SEC year on years. Some of the EC measures are mentioned below:

S N	Project Description	Investment (Rs. Lacs)	Energy saving (KWH/annum)	Power Cost Saving (Rs. Lacs/annum)
1	<b>Machine shop EC measures:</b> <ul style="list-style-type: none"> <li>• Productivity improvement on Mazak machining centre by optimisation of cutting parameters</li> <li>• Introduction of auto power off circuit in machine tools like Hobbing, washing, taper rolling, turning and presses</li> <li>• Installation of calendar timer in air ventilation switch board (80 Nos ventilators) to auto switching off during lunch / dinner time.</li> <li>• Modification to recover waste heat from GBA washing machines and application of thermal insulation to heating chamber</li> </ul>	9.16	223026	9.43
2	<b>Heat Treatment EC measures:</b> <ul style="list-style-type: none"> <li>• Optimisation of frequency of burn-out cycle in carburizing furnaces (Furnace parameter modifications)</li> <li>• Commonisation carburising cycle for Gearbox components with crown wheels by parameter optimization</li> <li>• Cooling tower fans control by introducing temperature controlled system</li> <li>• High capacity induction motors conversion from delta to star connection at feasible locations like hydraulic presses &amp; pumps</li> </ul>	0.21	345320	14.761
3	<b>Lighting installation EC measures:</b> <ul style="list-style-type: none"> <li>• Replacement of 65 W tube light rods with 58 W energy efficient tube light rods</li> <li>• Replacement of conventional tube lights with energy efficient CFL lamps in Shop offices and sub-stations</li> <li>• Replacement of 250W HPMV with 70 / 150W HPSV lamps in case of street light installation</li> <li>• Installation of 150Watts metal halide lamps in m/c shops</li> <li>• Optimisation of periphery lighting system</li> <li>• Installation of CFL type street lights (twin 55 W)</li> <li>• Timer based street lighting control (157 Nos)</li> </ul>	1.51	19123	1.31

<b>S N</b>	<b>Project Description</b>	<b>Investment (Rs. Lacs)</b>	<b>Energy saving (KWH/annum)</b>	<b>Power Cost Saving (Rs. Lacs/annum)</b>
4	<p><b>Compressed air system EC measures:</b> Optimization of power consumption of compressed air system by interconnecting 8 Nos. of air compressors and controlling through programmable logic controller. Implementation of various improvements in compressed air system:</p> <ul style="list-style-type: none"> <li>• Running of 1000 CFM compre. in day shift only</li> <li>• Night shift activities in CWP line and Heat Treatment are managed with portable compre.</li> <li>• During reduced production period (Oct-08-July-09), managing air supply with smaller capacity compressors (200/300/335/500 CFMs)</li> <li>• switching OFF all compressors during lunch / dinner breaks.</li> <li>• Closing of reservoir valves as soon as compressors are stopped during races</li> <li>• Provision of small portable compressors (40 CFM) at specific areas instead of running big compressors</li> <li>• Arresting air leakages and maintaining % leakage below 4%</li> <li>• Reduction in FAD points in shop floor</li> </ul>	18.60	271295	12.20
5	<p><b>Reactive Power Management:</b> Maintaining unity power factor, by the way of switching ON/OFF adequate no. of capacitor banks on daily basis. Thus, ensuring improvement in overall power system like voltage regulation, MD reduction etc and incidental benefit of incentive from MSEDCL on monthly basis</p>	1.22	--	36.09
6	<p><b>Renewable energy utilization:</b> Use of Wind power by the way of 3 party agreement (Wind power firm, MSEDCL &amp; Ashok Leyland)</p>	Agreement with wind power firm	50% of total plant power is wind power	90.00 Lacs KWH /Annum thru' wheeling
7	<p><b>Energy management software utilization:</b> Installation of Energy management software to monitor all electrical parameters of each feeder at 33 KV Mains Receiving Station. This facilitates better control on area-wise power consumption / PF and wastage avoidance. Saving is on account of reduction in power consumption of m/c shops during lunch and dinner breaks, overall MD reduction by 100 KVA every month and sustenance of Unity power factor on daily basis.</p>	4.44	60000.	4.50
	<b>Total</b>	<b>35.24</b>	<b>9.19</b>	<b>78.29</b>

Overall investment: **Rs 35.24 Lacs**  
Energy saving: **9.19 Lacs KWH / year**  
Energy cost saving: **Rs.78.29 Lac / year**  
Pay-back period: **10 months (Power factor incentive excluded)**

Note:

- Project wise details are available with us
- As a part of Environment (ISO 14000-2004) and Energy Management system implementation, every year we are implementing 50+ EC projects.

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