



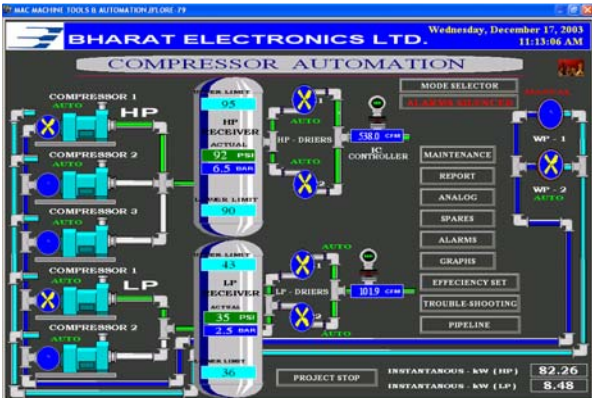
Energy Conservation Measure implemented in 2007-2008

ID to be filled by BEE	1. Replacement of old reciprocating chillers with energy efficient screw chillers with BMS		Sector: GENERAL category		
Year to be filled by BEE			Technology: screw chillers with BMS		
<p>Description of the energy conservation measure: The existing 3x 350TR reciprocating chillers operating @ specific power consumption (1.27 -1.38) is nearly 30% higher compared to design value (0.95 kW/TR). At the same time refrigeration generation capacity (around 58 TR) is also less compared to rated capacity (100 TR) of each compressor. These reciprocating compressors are replaced with EE screw chillers of 350 TR X 2 no.s.</p> <p>Annual energy savings : 160 X (5000 +1500) : 10.4 lakh kWh</p> <p>Annual cost savings (Rs 4.45 per kWh) : Rs. 46.28 lakh</p> <p>Investment required (two centrifugal chillers) : Rs. 100 lakh</p>					
Picture/ sketch/ drawing before modification (if available)			Picture/ sketch/ drawing after modification		
<p>The old reciprocating chillers operating specific power consumption (1.27 -1.38) is nearly 30% higher compared to design value (0.95 kW/TR). At the same time refrigeration generation capacity (around 58 TR) is also less compared to rated capacity (100 TR) of each compressor. These reciprocating compressors are 30 years old..</p>					
Agency that executed the project (with complete address and email): external supplier					
Total investment, Rs.:100 lakhs			Year of implementation: 2007-08		
First year energy cost savings, Rs.: 46.28 lakh					
First year other savings, Rs:					
On annual basis	kWh	Coal (Tons)	Gas Nm ³	Oil (kL)	Other
Energy consumption before	7286900				
Energy consumption after	6246000				
Energy tariff, Rs/ kWh/ Ton/ Nm ³ / kL ...	4.94/unit				
Company complete address: M/s Carrier				We authorise Bureau to use this information for dissemination	
Contact person who could be contacted for more information:				Signature	
				Date	


Energy Conservation Measure implemented in 2007-2008

ID to be filled by BEE	2. Turbine ventilation systems for hangars and Day light harvesting		Sector: GENERAL category		
Year to be filled by BEE			Technology: green technologies		
<p>Description of the energy conservation measure: Installation of zero energy wind turbine systems in place of conventional exhaust fan systems and harvesting of daylight in the assembly hangars have saved energy consumption</p> <p>Annual reduction in power consumption : 0.54 lakh kWh Annual cost savings : Rs.2.71 lakh</p>					
Picture/ sketch/ drawing before modification (if available)			Picture/ sketch/ drawing after modification		
<p>Old exhaust fan systems consuming more electrical energy and without any control mechanism were modernized with sunlight harvesting designs with zero energy wind turbine systems</p>					
Agency that executed the project (with complete address and email): external agency					
Total investment, Rs.:5.00 lakhs			Year of implementation: 2007-08		
First year energy cost savings, Rs.:0.54 lakh					
First year other savings, Rs.:					
On annual basis	kWh	Coal (Tons)	Gas Nm ³	Oil (kL)	Other
Energy consumption before	540000				
Energy consumption after	0				
Energy tariff, Rs/ kWh/ Ton/ Nm ³ / kL ...	4.94/unit				
<p>Company complete address: M/s wind turbine systems</p> <p>Contact person who could be contacted for more information:</p>				<p>We authorise Bureau to use this information for dissemination</p> <p>Signature</p> <p>Date</p>	

Energy Conservation Measure implemented in 2007-2008

ID to be filled by BEE	3.PLC based automation of Compressed Air Plant	Sector: GENERAL category			
Year to be filled by BEE		Technology: PLC			
Description of the energy conservation measure: Optimization of pressure settings for High Pressure generation based on the load requirement has resulted in energy savings					
	Parameter	Before Automation	After Automation		
	High Pressure Setting	102-117 Psi CFM 530	90-95 Psi CFM 530		
	Low Pressure Setting	36-44 Psi CFM 370	36-44 Psi CFM 370		
	Avg Daily Energy Consumption	2100 Kwhrs	1700 Kwhrs		
Advantages of the Automated System		Picture/ sketch/ drawing after modification			
<ul style="list-style-type: none"> ➤ Minimise high variations in Generation Pressure and optimization of pressure settings ➤ Refines Compressor response to match real system demand. ➤ Energy Savings to the extent of 15-20%. ➤ 100% Automation and remote monitoring. ➤ Sequences to achieve distribution of load over all compressors. ➤ Display of pressure, flow & other data for online, history and trending. 					
Agency that executed the project (with complete address and email): thro external agency					
Total investment, Rs.: 11.50lakhs		Year of implementation: 2006-08			
First year energy cost savings, Rs.: 5.98 lakhs					
First year other savings, Rs:					
On annual basis	kWh 000'	Coal (Tons)	Gas Nm ³	Oil (kL)	Other
Energy consumption before	630000				
Energy consumption after	510000				
Energy tariff, Rs/ kWh/ Ton/ Nm ³ / kL ...	4.94/unit				
Company complete address: M/s Mac Machine Tools & Automation, No 732/1, 3 rd Block, 3 Stage Basaweswara Nagar, Bangalore-79 email: machindia@vsnl.net				We authorise Bureau to use this information for dissemination	
Contact person who could be contacted for more information:				Signature	
				Date	


Energy Conservation Measure implemented in 2007-2008

ID to be filled by BEE	4. Installation of Variable Speed Drives for Blowers in AHU's	Sector: GENERAL category			
Year to be filled by BEE		Technology: VSD's			
<p>Description of the energy conservation measure: Installation of VSD's – for AHU 9/10 at Chiller Plant(components).After installations blowers were operated at lower speed (20 - 30%)less speed than rated) this has resulted in reduction in power consumption</p> <p>Present power consumption of blowers</p> <p>Present operating blowers power cons. (2 no.s) : 106 kW</p> <p>Estimated reduction in power consumption (2 no.s): 42 kW (At 20% less speed)</p> <p>Annual operating hours : 4000 (AHU 9 -8 hr, AHU 10 -16hr per day)</p> <p>Annual reduction in power consumption : 1.68 lakh kWh</p> <p>Annual cost savings : Rs. 8.01 lakh</p>					
Picture/ sketch/ drawing before modification (if available)			Picture/ sketch/ drawing after modification		
<p>Blowers were operated as per the requirement. The measured air flow was around 70% of the rated capacity, the requirement of air flow was varying as per ambient conditions. After analysis the best method to control the air flow rate was brain stormed and by optimizing the speed of the blower, the air flow requirement was found reduced by 50%. The present plant is operating one blower in each AHU. For reduction /control in air flow variable speed drivers are installed to the blowers.</p>					
Agency that executed the project (with complete address and email): Inhouse					
Total investment, Rs.:12 lakhs			Year of implementation: 2007-08		
First year energy cost savings, Rs.: 8.01 lakh					
First year other savings, Rs.:					
On annual basis	kWh	Coal (Tons)	Gas Nm ³	Oil (kL)	Other
Energy consumption before	424000				
Energy consumption after	256000				
Energy tariff, Rs/ kWh/ Ton/ Nm ³ / kL ...	4.94/unit				
Company complete address: M/s ABB , Bangalore				We authorise Bureau to use this information for dissemination	
Contact person who could be contacted for more information:				Signature	
				Date	

Energy Conservation Measure implemented in 2007-2008


ID to be filled by BEE	6.Improvement of LT bus Power Factor to 0.98 and above				Sector: GENERAL category	
Year to be filled by BEE					Technology: APFC	
<p>Description of the energy conservation measure: Power factor of the plant was varying in the range of 0.92 to 0.94 lag. Additional capacitors were installed to improve overall peak-load PF to around 0.98 lag and also capacitors banks were relocated for better compensation. After implementation the PF has improved to .98 with reduction in KVA demand by about 350 to 4000 KVA. With saving in demand charges paid to EB by Rs. 72000 per month. The distribution losses is also found reduced by 10% [$(1-(0.93/0.98)^2) \times 100\%$] which has resulted in energy savings of 0.64 lakh units per year</p>						
Picture/ sketch/ drawing before modification (if available)			Picture/ sketch/ drawing after modification			
Study of power factor management in the plant revealed that the capacitor banks installed at various substations are not delivering their full rated output and this is due to voltage rating of 440-450V for capacitors. Also some of the relays on APFC panels are not functioning, which was taken up with suppliers and set it right to 0.98 for effective compensation.			Installed additional capacitors of 1300-1400 kVAR to reduce kVA demand. Summation based CT system is introduced for sensing reactive power demand and also adjust the existing level of APFC correction to maintain the power factor above 0.98 at all bus-sections.			
Agency that executed the project (with complete address and email): Inhouse						
Total investment, Rs.:11.2 lakhs			Year of implementation: 2007-08			
First year energy cost savings, Rs.: 3.12 lakhs						
First year other savings, Rs.: 6.84 Lakhs						
On annual basis	kWh 000'	Coal (Tons)	Gas Nm ³	Oil (kL)	Other	
Energy consumption before (Only Distribution losses)	14.98 lakhs				400 KVA demand reduction	
Energy consumption after	14.34 lakhs					
Energy tariff, Rs/ kWh/ Ton/ Nm ³ / kL ...	5.04 /unit					
Company complete address: APFC panels from M/s Neptune Ducati Pvt Ltd				We authorise Bureau to use this information for dissemination		
Contact person who could be contacted for more information:						
				Signature		
				Date		

Energy Conservation Measure implemented in 2007-2008

ID to be filled by BEE	7. Replacing/Downsizing of Existing old and Standard Motors with Energy Efficient Motors	Sector: GENERAL category			
Year to be filled by BEE		Technology: Energy Efficiency Motors			
<p>Description of the energy conservation measure: Optimum sizing of motor as per the actual process requirement to improve the motor efficiency by means of improved percentage loading, improved power factor and reduced heat losses. At Central Chiller Plant Existing old 3 No's of Chilled water pump: 18.5 KW, with FL efficiency of 87% operating hours of 4800/year were replaced with same rating of Energy efficient motors of FL efficiency 91.3% At Compressor plant Existing old 2 no's of Compressor motors: 90 KW with FL efficiency of 90% operating hours of 8700/year replaced with same rating of EEM of FL efficiency 95.8% Existing old 1 no.of Compressor motor with 120KW with FL efficiency of 90% operating hours of 8700/year downsized to 90KW rating of EEM of FL efficiency 95.8%</p>					
Picture/ sketch/ drawing before modification (if available)			Picture/ sketch/ drawing after modification		
<p>It was observed potential to replace the existing energy inefficient motors with appropriate size motors and replaced with energy efficient motors.</p>			<p>Approx. kW reduction:16.75 kW Annual kWh savings :1.34 lakh kWh Annual cost savings :Rs. 6.71 lakh</p> <div style="text-align: center;">  </div>		
Agency that executed the project (with complete address and email): Inhouse					
Total investment, Rs.:8.10 lakhs			Year of implementation: 2007-08		
First year energy cost savings, Rs.:6.71lakhs					
First year other savings, Rs.:					
On annual basis	kWh	Coal (Tons)	Gas Nm ³	Oil (kL)	Other
Energy consumption before	2507953				
Energy consumption after	2373910				
Energy tariff, Rs/ kWh/ Ton/ Nm ³ / kL ...	4.94/unit				
Company complete address: M's ABB, M/s SIEMENS M/s CROMPTION GREAVES Contact person who could be contacted for more information:				We authorise Bureau to use this information for dissemination Signature Date	


Annexure 'B'

Energy Conservation Measure implemented in 2007-2008

ID to be filled by BEE	Providing VFD to Cooling Tower		Sector: GENERAL category		
Year to be filled by BEE			Technology:		
<p>Description of the Energy conservation measure:</p> <p>Present system – Two cooling towers of capacity 300 TR each are run for cooling condensed water of 345 TR capacity screw chiller. Whereas requirement of cooling tower capacity for 345 TR chiller is 415 TR. Two Nos. of combined capacity 600 TR cooling towers are run due to non-availability of exact capacity (415TR).</p> <p>Implemented system – Temperature controlled Variable Frequency Drive has been integrated to one of the cooling tower. This particular cooling tower fan motor runs at variable speed based on requirement. After implementation one cooling tower of capacity 300 TR and the other cooling tower with VFD at variable speed is run so that 415 TR capacity is met.</p> <p>Remarks : After implementation one cooling tower is running at full load and one more cooling tower with VFD running at 50% load. This leads to an energy conservation of 9400 Kwhr/ year.</p>					
Picture/ sketch/ drawing before modification (if available)			Picture/ sketch/ drawing after modification		
Constant Speed Motor			 <p style="text-align: center;">VFD integrated to Cooling Tower Fan Motor</p>		
Agency that executed the project (with complete address and email): Mac Machine Tools, machindia@vsnl.net					
Total investment, Rs.: 0.35 lakh			Year of implementation: 2007-08		
First year energy cost savings, Rs.:0.47 lakhs					
First year other savings, Rs.:					
On annual basis	kWh	Coal (Tons)	Gas Nm³	Oil (KL)	Other
Energy Consumption before					
Energy Consumption after					
Energy tariff, Rs/kWh/ Ton/ Nm ³ /kL...					
Company Complete address:				We authorize Bureau to use this information for dissemination Signature Date	
Contact person who could be contacted for more information:					



Annexure 'B'

Energy Conservation Measure implemented in 2007-2008

ID to be filled by BEE	Providing variable feed controller for High pressure compressed air network	Sector: GENERAL category			
Year to be filled by BEE		Technology:			
<p>Description of the Energy conservation measure:</p> <p>Present system: High pressure (range-6 to 7.3 kg/sqcm) compressed air is being generated at central compressed plant and distributed to 62 machines through pipeline network. Though the requirement is 5.6 to 6.8 kg/sq.cm. at the end user based on requirement of each machine but generation is at 6 to 7.3 kg/sq.cm. due to huge network. This leads to more power consumption. The present system pushes the compressed air irrespective of the requirement at the end user.</p> <p>Implemented system: A pressure sensor based automatic variable feed controller system has been installed in the network. This controller operates outlet valve based on demand at the end user. After installation of VFC outlet pressure in 1st shift is set at 6.9 kg/sq.cm. and 2nd shift at 6.6 kg/sq.cm. This has resulted in not only reduction in power consumption by 22,500 kwhr/year also a regulated compressed air pressure to the end user.</p>					
Picture/ sketch/ drawing before modification (if available)			Picture/ sketch/ drawing after modification		
No Feed (Pressure) Regulator			 <p style="text-align: center;">New Demand Based Variable Feed Controller</p>		
Agency that executed the project (with complete address and email): Energy Logistics Pvt. Ltd.,					
Total investment, Rs.: 3.2 lakhs			Year of implementation: 2007-08		
First year energy cost savings, Rs.: 1.13 lakhs					
First year other savings, Rs.:					
On annual basis	kWh	Coal (Tons)	Gas Nm³	Oil (KL)	Other
Energy Consumption before					
Energy Consumption after					
Energy tariff, Rs/kWh/ Ton/ Nm ³ /kL...					
Company Complete address:				We authorize Bureau to use this information for dissemination Signature	
Contact person who could be contacted for more information:				Date	



Annexure 'B'

Energy Conservation Measure implemented in 2007-2008

ID to be filled by BEE	Redesigning of borewell pumpsets		Sector: GENERAL category			
Year to be filled by BEE			Technology:			
<p>Description of the Energy conservation measure: Present System : Totally there are 46 borewells, each borewell is equipped with pumpset of capacity ranging from 5 to 7.5HP. Specific energy consumption is 1.43KW/Kilo Liter of water output. Implemented System : Using six sigma methodology thorough study has been conducted for capacity, flow and head of each of the pumpset. Improvement has been made in 2 stages viz, 1) automation of all borewells for operation and 2) redesigning of pumpset capacity based on out put of each borewell. This has resulted in reduction of specific energy consumption from 1.43 to 0.77KW/KL. Total reduction of specific energy consumption is 0.66KW/KL, in tern it has resulted in annual savings of 4.7 Lakhs KWHR.</p>						
Picture/ sketch/ drawing before modification (if available)			Picture/ sketch/ drawing after modification			
 <p style="text-align: center;">Old High Capacity Pumpsets (38 Nos.)</p>			 <p style="text-align: center;">New Energy Efficient Re designed (low capacity) pumpsets (38 Nos.)</p>			
Agency that executed the project (with complete address and email): Pump & pump Aids.						
Total investment, Rs.: 7.0 lakhs			Year of implementation: 2007-08			
First year energy cost savings, Rs.: 23.5 lakhs						
First year other savings, Rs.:						
On annual basis		kWh	Coal (Tons)	Gas Nm³	Oil (KL)	Other
Energy Consumption before						
Energy Consumption after						
Energy tariff, Rs/kWh/ Ton/ Nm ³ /kL...						
Company Complete address:					We authorize Bureau to use this information for dissemination	
Contact person who could be contacted for more information:					Signature	
					Date	

Annexure 'B'

Energy Conservation Measure implemented in 2007-2008

ID to be filled by BEE	Installation of Demand based Pumping system for chilled water supply	Sector: GENERAL category				
Year to be filled by BEE		Technology:				
Description of the Energy conservation measure:						
<p>Present System: We have 1180TR capacity central chiller plant. 13 Air Handling Units are connected to this plant. During 1st shift 2 chilled water pumps of capacity 30HP each are run to circulate chilled water to 13 AHUs. During 2nd shift also 2 chilled water pumps of capacity 30HP each are run to circulate chilled water to only 2 AHUs. Here it can be seen that though the requirement of water is for only 2 AHUs, however 2 pumpsets of combined capacity 60HP are run, due to 1) Huge chilled water network 2) Near AHUs 3 way valves are installed 3) Constant speed motors. This present system found to be highly inefficient.</p> <p>Implemented System : All the AHUs' way valves have been converted to 2 way valves. During 2nd shift except 2 AHUs all other AHU valves are closed. 1 No. of 30 HP old pump has been dismantled. In place of old 30 HP pumpset a new highly innovative and state of the art demand based pumping system has been installed. This system operates pumps with the help of VFD based on demand at the end. It has been designed such a way that 2 Nos. of 15 HP pumps are put in place of old 30 HP pump so that even if 5 HP demand is met. The new pumps are pressure sensor based and are run automatically. With the new system total of 98000 KWHR/yr. is saved.</p>						
Picture/ sketch/ drawing before modification (if available)			Picture/ sketch/ drawing after modification			
 <p style="text-align: center;">Old Constant Speed Pumpset</p>			 <p style="text-align: center;">New Energy Efficient Demand Based Pumping System</p>			
Agency that executed the project (with complete address and email): Saptha Engineers, E-mail : info@sapthagroup.com						
Total investment, Rs. : 8.7 lakhs			Year of implementation: 2007-08			
First year energy cost savings, Rs.: 4.9 lakhs						
First year other savings, Rs.:						
On annual basis		kWh	Coal (Tons)	Gas Nm³	Oil (KL)	Other
Energy Consumption before						
Energy Consumption after						
Energy tariff, Rs/kWh/ Ton/ Nm ³ /kL...						
Company Complete address:					We authorize Bureau to use this information for dissemination Signature Date	
Contact person who could be contacted for more information:						

Annexure 'B'

Energy Conservation Measure implemented in 2007-2008

ID to be filled by BEE	Retrofitting of window AC units with Energy Efficient Compressors	Sector: GENERAL category			
Year to be filled by BEE		Technology:			
Description of the Energy conservation measure:					
Present System : Out of 200 window air conditioners, 40 air conditioners are with very old SR-1622 type. These compressors consume 2.23Kwhr/Hr.					
Implemented system: Market survey has been conducted for replacement of only compressor instead of entire window AC Unit. Accordingly a highly energy efficient compressor of type CR K6M PF1-131 has been put in place of old compressor. Thos compressor consumes 1.63Kwhr/Hr. There by a savings of 15024 Kwhr of energy has been saved during the year 2007-08 by replacing 10 compressors.					
Picture/ sketch/ drawing before modification (if available)	Picture/ sketch/ drawing after modification				
					
OLD COMPRESSOR	ENERGY EFFICIENT COMPRESSOR				
Agency that executed the project (with complete address and email): Kirloskar Coplan					
Total investment, Rs.: 1.9 lakhs	Year of implementation: 2007-08				
First year energy cost savings, Rs.: 0.8 lakhs					
First year other savings, Rs.:					
On annual basis	kWh	Coal (Tons)	Gas Nm ³	Oil (KL)	Other
Energy Consumption before					
Energy Consumption after					
Energy tariff, Rs/kWh/ Ton/ Nm ³ /kL...					
Company Complete address:				We authorize Bureau to use this information for dissemination	
Contact person who could be contacted for more information:				Signature	
				Date	