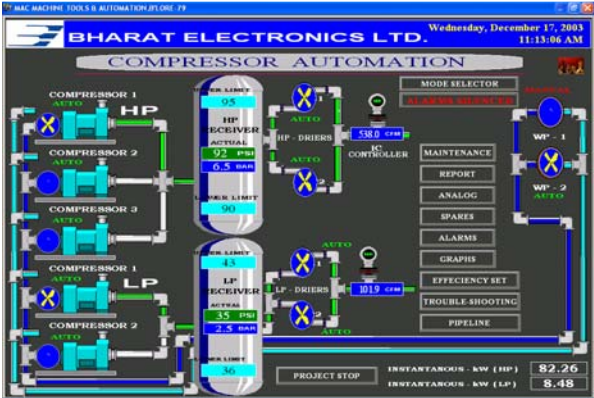



Energy Conservation Measure implemented in 2006-2007

ID to be filled by BEE	1.PLC based automation of Compressed Air Plant	Sector: GENERAL category			
Year to be filled by BEE		Technology:			
Description of the energy conservation measure: Optimization of pressure settings for High Pressure generation based on the load requirement has resulted 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):					
Total investment, Rs.: 11.50lakhs		Year of implementation: 2005-07			
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 2006-2007

ID to be filled by BEE	2. 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 operate blowers at lower speed (20 - 30% less speed than rated) this results 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>Expected 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>Normally blowers are operated as per the requirement. The measured air flow from these blowers is around 70% of the rated capacity, the requirement of air flow varies as per ambient conditions. The best method to control the air flow rate is by optimising the speed of the blower. The air flow requirement will go down as low as 50% some times and present plant is operating one blower in each AHU. For reduction in flow variable speed drivers can be installed to these blowers. Taking in to high investment cost for VSD's, it better to install for higher capacity blowers taking in to consideration of operating hours.</p>					
Agency that executed the project (with complete address and email):					
Total investment, Rs.:12 lakhs			Year of implementation: 2006-07		
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 2006-2007

ID to be filled by BEE	3.Installation of two-ways valves near the AHU's		Sector: GENERAL category		
Year to be filled by BEE			Technology:		
Description of the energy conservation measure: Installation of two way valves in place of 3 way valves to control the water flow rate for 7 no's of AHU's which are loded only 10-50%. After implemaenation one chilled water pump can be swityche off out of three running pumps. After installation of two way valves further fine tuning of chilled water flow can be down by installation variable speed drives (VSD's) to chilled water pumps.					
Picture/ sketch/ drawing before modification (if available)			Picture/ sketch/ drawing after modification		
It observed that refrigeration load near the connected AHU's is very less. The chilled water line three –way valves opened 10 –50% only, where heat load from users is very less. To pump chilled water up to AHU's three chilled water pumps are in use, even actual requirement of chilled water flow to the AHU's is only 10- 50% continuously, 100% chilled water is circulated in the chilled water circuit. Present operating chilled water pumps : 20.3 +21.2+21.7 Power consumption: 63.2 kW			Installed two –way valves near the AHU's (7 no.s) to control the water flow rate. Once the water flow rate is restricted than pressure build-up in the circuit will increase. During the same period stop the chilled water flow rate through non-operating chillers by closing the valves. After implantation of this measure one chilled water pump can be switched off out of the three running pumps. Energy saving by switching-off 1pump:20.3 kW Annual operating hours : 3000 hrs Annual reduction in consumption: 0.619 lakh kWh Annual cost savings : Rs.3.05 lakh		
Agency that executed the project (with complete address and email):					
Total investment, Rs.: 2 way valves 3.5 lakh			Year of implementation: 2006-07		
First year energy cost savings, Rs.: 3.05 lakh					
First year other savings, Rs.:					
On annual basis	kWh	Coal (Tons)	Gas Nm ³	Oil (kL)	Other
Energy consumption before	189600				
Energy consumption after	128700				
Energy tariff, Rs/ kWh/ Ton/ Nm ³ / kL ...	4.94/ unit				
Company complete address:				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 2006-2007

ID to be filled by BEE	5.Improvement of LT bus Power Factor to 0.98 and above				Sector: GENERAL category	
Year to be filled by BEE					Technology:	
<p>Description of the energy conservation measure: The present power factor of the plant is varying in the range of 0.92 to 0.94 lag. However, the average PF is > 0.94 lag due to capacitors switched during low load periods also. Considering the present operating loads and peak-load PF of 0.93 lag at existing level of PF compensation, additional capacitors installed to improve overall peak-load PF to around 0.98 lag. With the implementation of above measures, the plant maximum demand is likely to reduce by about 350-400 kVA by improving the power factor in the range of 0.96-0.98 and above. The distribution losses reduced by 10% [$(1 - (0.93/0.98)^2) \times 100\%$] which resulted 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 needs to taken up with suppliers and set to 0.98 for effective contribution of available banks at peak-loads.			Installed additional capacitors of 1300-1400 kVAR to minimise kVA demand. Avoiding summation based CT system 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. Since there are bus-sectionalisation with bus-coupler normally opened the compensation on both the side is a correct approach.			
Agency that executed the project (with complete address and email):						
Total investment, Rs.:11.2 lakhs			Year of implementation: 2006-07			
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 2006-2007

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 requirements will improve the motor efficiency by means of improved percentage loading, improved power factor and reduced heat losses. 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 replaced with same rating of Energy efficiency motor of FL efficiency 91.3% 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		
It was observed potential to replace the existing motors with appropriate size motors and replacing some of existing standard motors with energy efficient motor.			Approx. kW reduction:16.75 kW Annual kWh savings :1.34 lakh kWh Annual cost savings :Rs. 6.71 lakh <div style="text-align: center; margin-top: 10px;">  </div>		
Agency that executed the project (with complete address and email):					
Total investment, Rs.:8.10 lakhs			Year of implementation: 2006-07		
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				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 2006-2007

ID to be filled by BEE	8. Installation of Electronic Chokes in place of Conventional Copper Chokes for tube lights	Sector: GENERAL category			
Year to be filled by BEE		Technology:			
<p>Description of the energy conservation measure: Out of 11075 No. of lamps, it is estimated that 25% has e-chokes. There are about 8300 no. of Fluorescent tubes of 36W with conventional chokes in the plant. Out of these 2100 fittings were replaced with Electronic chokes in phased manner. The power factor with conventional copper chokes is very poor and is below 0.7 in some areas. The power consumption of the tube light fitting with conventional copper choke is about 50 W, whereas the same consume only 25 W with electronic choke owing to its high frequency operation.</p> <p>Power saving with e-choke : 25 W No. of choke considered for replacement : 2100</p> <p>Reduction in kW : $\frac{2100 \times 25}{1000} = 52.5 \text{ kW}$</p> <p>Energy savings : 52.5 x 8h x 330days : 1.386 lakh kWh Value of annual savings :Rs. 6.84 lakh</p>					
Picture/ sketch/ drawing before modification (if available)			Picture/ sketch/ drawing after modification		
The power factor with conventional copper chokes is very poor and is below 0.7 in some areas. The power consumption of the tube light fitting with conventional copper choke is about 50 W			Tube light fitting with The Electronic Choke consumes only 25W against 50W in case of conventional choke		
Agency that executed the project (with complete address and email):					
Total investment, Rs.: 8.2 lakhs			Year of implementation:		
First year energy cost savings, Rs.: 6.84 lakhs					
First year other savings, Rs.:					
On annual basis	kWh 000'	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 authorise Bureau to use this information for dissemination	
Contact person who could be contacted for more information:				Signature	
				Date	

Energy Conservation Measure implemented in 2006-2007

ID to be filled by BEE	11.Overhauling of Radar DX plant				Sector: GENERAL category
Year to be filled by BEE					Technology:
<p>Description of the energy conservation measure: The evaluated specific power consumption of the radar DX-plant is high (3.33 kW/TR) compared to all other operating DX-plants (around 1.0 kW/TR). At same time measured condenser water flow rate through DX-plant is low compared to design condenser water flow. The radar DX-plant operates continuously around the clock.</p>					
Picture/ sketch/ drawing before modification (if available)			Picture/ sketch/ drawing after modification		
<p>The evaluated specific power consumption of the radar DX-plant is high (3.33 kW/TR) compared to all other operating DX-plants (around 1.0 kW/TR). At same time measured condenser water flow rate through DX-plant is low compared to design condenser water flow. The radar DX-plant operates continuously around the clock. Before sp. power consumption :3.33 kW/TR Refrigeration load from DX-plant: 4.0 TR</p>			<p>It is recommended to take complete overhauling/maintenance of the DX-plant. The specific power consumption of the compress should be brought to the level equivalent to other compressors (1.0 kW/TR). By improving performance of the DX-plant operating hours (ON period) will come down After sp. Power consumption :1.0 kW/TR (After overhauling) Reduction in power consumption of compressor : $4.0 \times (3.33 - 1.0) : 9.3 \text{ kW}$ Annual cost savings : Rs. 2.73 lakh</p>		
Agency that executed the project (with complete address and email):					
Total investment, Rs.: 1.0 lakh			Year of implementation:2006-07		
First year energy cost savings, Rs.: 2.73 lakhs					
First year other savings, Rs.:					
On annual basis	kWh	Coal (Tons)	Gas Nm ³	Oil (kL)	Other
Energy consumption before	87912				
Energy consumption after	26400				
Energy tariff, Rs/ kWh/ Ton/ Nm ³ / kL ...	4.94/ unit				
Company complete address:				We authorise Bureau to use this information for dissemination Signature Date	
Contact person who could be contacted for more information:					

Energy Conservation Measure implemented in 2006-2007

(To be filled up separately for each Energy Conservation Measure)

ID to be filled by BEE	Title of the measure				Sector: GENERAL category	
Year to be filled by BEE					Technology:	
Description of the energy conservation measure:						
Picture/ sketch/ drawing before modification (if available)			Picture/ sketch/ drawing after modification			
Agency that executed the project (with complete address and email):						
Total investment, Rs.:			Year of implementation:			
First year energy cost savings, Rs.:						
First year other savings, Rs.:						
On annual basis	kWh 000'	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 authorise Bureau to use this information for dissemination		
Contact person who could be contacted for more information:				Signature		
				Date		

Note: Please submit this sheet separately for each Energy Conservation Measure implemented in 2006-2007 and a CD containing the above information may be please be enclosed.