

## INDIAN ALUMINIUM COMPANY, LIMITED BELUR, WEST BENGAL

### i). Unit Profile :

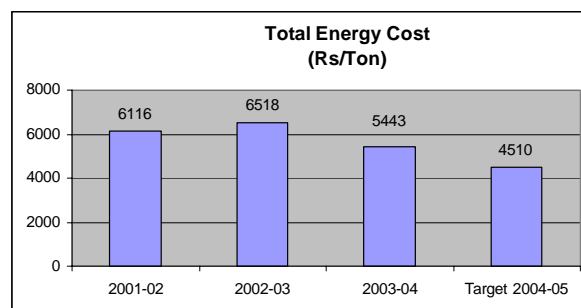
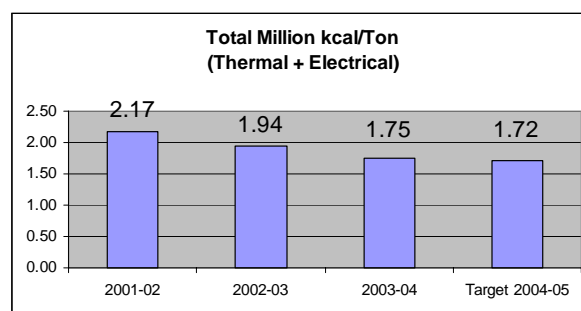
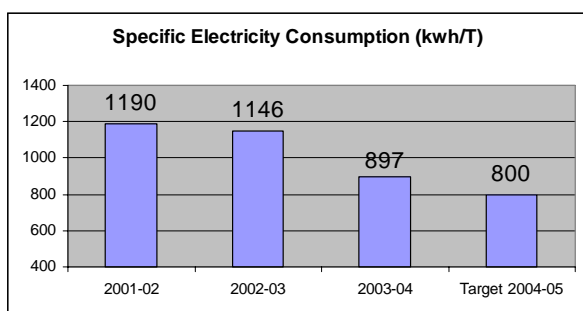
Indian Aluminium Company, Limited has got an aluminium rolled products factory at 39, G.T.Road, Belurmah, Howrah with a capacity of 45,000 tonnes per annum. This unit is 64 years old and is the oldest factory of the company as well as the oldest aluminium sheet factory in India. During the financial year 2003-04, the factory has produced 44727 tonnes (Rs. 436 crores) of aluminium sheet. It is one of the most diversified aluminium sheet factories in the world capable of manufacturing 32 different alloys and supplying to the Defence, Packaging, Bottle Closure, Pressure Cooker, Automobile and Building industry throughout India. In 2003-04, about 10620 tonnes of sheet were exported from the factory.

### ii). Energy Consumption :

- Energy Cost comprises about 30 % of the total plant cost. The basic energy inputs are Electricity, Furnace Oil and Coal Gas. There has been a steep increase in the cost of energy, specially electricity over the years, the unit has however been able to maintain/reduce its energy cost per ton of production through concentrated Energy Conservation efforts.

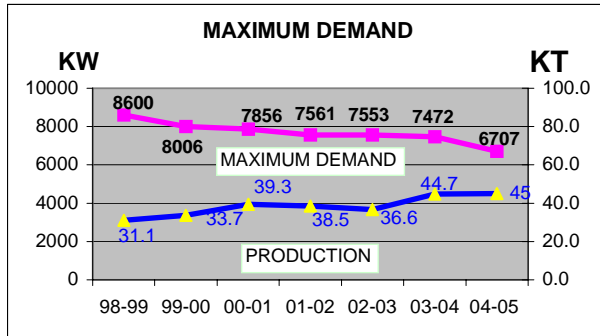
#### Specific Energy Consumption

- The unit along with implementation of numerous energy saving projects have also taken up fuel switching project and has converted one of its preheating furnace from electricity to coal gas heating in 2003-04. The second preheating furnace was also converted during early 2004-04. This has led to reduction in specific electricity consumption and also total energy cost. There has been also a reduction in the total energy input to the plant in terms of Million kCal per ton through energy conservation efforts.



### Reduction in Maximum Demand

The Plant has also been able to reduce its Maximum Demand over the years through effective Demand Management through planning process, reduction in consumption level and finally through fuel switching. This has been possible even with increase in production volume.



### iii). Energy Conservation Commitment, Policy and Organisational Set-up

Energy Conservation Commitment is driven through Corporate Energy Policy. The same is enclosed. The unit has adopted this policy in its day to day activity and has integrated the same

### iv). Energy Conservation Achievements

#### Details of major action taken during 2003-04:

The year 2003-04 was the year for consolidation of all energy saving projects implemented during 2002-03. Major actions taken during the year 2003-04 are as follows:

- i) Conversion of the first Preheating furnace (1600 kW) from Electricity to Coal gas heating.
- ii) Optimisation and fuel switching of heating systems at Remelt
- iii) Revamping and optimisation of the compressed air system. This involved compressed air system audit by reputed agency and implementation of audit recommendation.
- iv) System optimisation of various systems operating with VFD.
- v) Installation of Automatic Voltage Regulator Transformer of 300 kVA & thereafter 150 kVA for the entire Plant lighting load.
- vi) Preheating & Annealing Furnace loss reduction through replacement of doors by improved design, rating optimisation, automation & insulation change at some places
- vii) Capacity optimisation of various pumps.
- viii) Tuning of systems already fitted with VFD
- ix) Number of other actions were initiated during 2003-04 for projects with high implementation time that were finally implemented during early 2004-05. Some of these are:
  - Elimination of the MG sets for the Main (1150 kW) & Coiler (450 kW) drive of the Bliss cold rolling mill with DC drive.
  - Conversion of the second Preheating Furnace



Coal Gas System at Preheater



### Energy conservation plan and targets :

- (1) Fuel switching project to be taken up in annealing furnace, converting electrically heated furnace into coal gas heating furnace using radiant tube burners.
- (2) Detailed Energy Audit was carried out in July 2004, many new projects have been identified. These will be implemented during next few months.

The immediate target for 2004-05 have been provided above.

### Environment and safety:

#### Environment

- The Plant is well within the prescribed norms set by the State Pollution Control Board in terms of discharge of effluents and gaseous emissions.
- The plant water consumption has been brought down further through specific water recycling projects and enhancing rain water harvesting. The plant water consumption during 2003-04 has been 1.79 KI per Ton compared to 2.07 KL per Ton during 2002-03
- The plant effluent discharge has also reduced from 155 KL/Day during 2002-03 to 132 KL/Day in 2003-04
- Reduction of plant energy consumption has directly contributed towards reducing GHG emission, specially after implementation of the fuel switching projects.
- All actions are driven through ISO 14001
- The plant has received "Greentech Environment Excellence Award 2002-03" (Silver Award) in Metal sector from M/s Greentech Foundation, New Delhi (copy enclosed)

#### Safety :

- The year 2003-04 has been an accident free year for the unit.
- The plant has also implemented OHSAS 18001 system and has obtained certification in March 2004 (copy enclosed). All minor injuries are analysed and corrective & preventive actions are initiated to prevent bigger lapses.
- Regular plant safety rounds are conducted by senior personnel.
- Safety audits are carried out at regular intervals.
- The unit has a two tire safety committee which meets every month to discuss safety and occupational health related issues.
- The plant has received "Certificate of Appreciation" in 2003-04 from CII-Eastern Region for efforts towards Safety Management (copy enclosed)

## DETAILS OF PROJECT EXECUTED DURING 2003-04

### Indian Aluminium Company Limited, Belur Works

#### Conversion of Ingot Preheating Furnace from Electricity to Coal Gas Heating.

Background :

Ingot Preheating operation (prior to Hot Rolling) is energy intensive and traditionally this is done in electrically heated furnaces. The Belur unit has three such furnaces of 1600 kW each. Preheating alone consumes about 30% of the total electricity consumption. While expensive estimates were made in the past for conversion of these furnaces with radiant tube burners, in the year 2003-04, project for conversion with direct fired burners was taken up in one of the furnaces. This has resulted in reduction in electricity consumption and huge cost savings. This has also led to improved productivity through reduction in preheating cycle time.

#### Comparison of Efficiencies

Condition	Efficiency	Cost
<b>Electrical Heating</b> Specific electricity consumption with electrical heaters	260 kWh/Ton	Rs. 1290 /Ton
<b>Coal Gas Heating</b> Specific electricity consumption with coal Gas heating	17 Therms/Ton	Rs. 400/Ton
Electricity consumption for circulating & combustion fans	15 kWh/Ton	Rs. 74/Ton
		Total = Rs. 474/Ton
<b>Savings</b>		Rs. 816/Ton

Savings per Annum

Form one furnace @ 2475 Tons/Month x Rs 816/Ton x 12 Months = Rs. 242 Lakhs

Investment = 30 Lakhs

Simple Payback = 2 Months

The second Preheating furnace was also converted at the beginning of 2004-05

#### Rating Standardisation & Improved Door design at Batch Annealing Furnace No. 7

##### Background

Belur has a total of 6 Annealing furnaces of which No.- 7 is of maximum capacity (30 Ton with 1600 kW heater). Annealing is the second largest consumer of electricity after preheating and the total annealing consumption is about 22% of the plant total.

It was observed that in Annealing Furnace No.- 7, for most type of loads, the heaters get off after 30-60 mins of a typical annealing cycle of 6 Hours. This was also leading high Demand requirement for the first one hour of the cycle. Provision was thus made to toggle rating of the furnace between 1600 & 1000 kW based on requirement and furnace was controlled based on metal temperature.. This resulted in MD reduction and also reduction energy consumption. The furnace door was changed with improved design to reduce door losses.

Savings per Annum = 1 Lakh units = Rs. 4.96 Lakh per annum

Investment = Rs. 2.5 Lakhs

Simple Payback = Rs. 6 Months

## Revamping of Batch Annealing Furnace No.- 2

Batch Annealing was the only left out Small annealer (5 Ton capacity, 200 kW) which still had Brick type insulation. The same was replaced by Ceramic insulation. VFD were installed for the two re-circulation fans for temperature based operation.

Savings = 0.24 Lakh units/Annum  
= Rs 1.2 Lakhs/Annum

Investment = Rs 6 Lakhs

Simple Payback = 5 Years

## Efficiency improvement in Compressed Air System

### Background

The air compressor operation consumes about 1.56 Lakh units per month. A detailed compressed air audit was conducted through a reputed agency focussing right from generation and upto to the various consumption points.

Based on the audit the following actions were taken:

- Installation of System Pressure Optimiser
- Installation of Automatic ON/OFF Controller based on pressure sensing
- Installation of 4 nos of additional Air Receivers.
- Installation of Zero Air loss Type Automatic Drain Traps
- Replacement of V-Belts of all the 6 Compressors
- Pipe size optimisation at some locations.
- System for Condition Monitoring for compressors was introduced.



Picture of System pressure Optimizer

Annual Consumption Before project = 18.7 Lakh Units

Annual Consumption After project = 15.1 Lakh Units

Annual Savings = 3.1 Lakh Units = Rs. 15.5 Lakhs

Investment = Rs 18 Lakhs

Simple Payback = 14 Months

## Installation of Automatic Voltage Regulator for Plant Lighting Load

### Background

The Plant lighting load comprises of Plant lighting system, Boundary Lighting, Office Lighting system, Single phase fans and room air-conditioner etc. Voltage setting of the distribution transformer has been kept such that the single phase voltage of 220 VAC is obtained during the evening hours, when the system voltage is on the lower side. Thus for period except the evening hours, the single phase voltage is greater than 230 VAC and thereby leading to additional consumption during these periods. This led us to install automatic voltage regulators of 300 KVA & 150 kVA in the lighting circuits.

Annual Consumption

Before Project = 18.24 Lakh Units

After Project = 16.80 Lakh Units

Savings = 1.44 Lakh Units

= Rs 7.14 Lakhs/Annum

Investment = Rs 5 +3 Lakhs

Simple Payback = 14 Months



### **Other Benefits**

- Improvement in Evening Illumination
- Increased Lamp Life

### **Various Size Pump Optimisation**

Various pumps were identified to be of over capacity and working in low efficiency points. Initially impeller trimmings were carried out. These were replaced with pumps of right capacity for further benefits.

Total numbers of pumps replaced = 8

Savings Achieved = 1.08 Lakh units/Annum = Rs. 5.4 Lakhs

Investment = Rs. 2 Lakhs

Simple Payback = 5 Months

### **Heating system optimisation and fuel switching:**

- The Pin heating furnace of 24 kW at Remelt was converted to coal Gas Heating
- Ammonia Cracking Furnace of 8 kW at Nitrogen Plant was converted to coal Gas Heating
- Furnace oil Heating system of 24 kW at Remelt was optimised with improved temperature control system.

Electrical Energy Saved = 1.16 Lakh Units/Annum

= Rs 4.9 Lakhs/Annum (after adjustment for coal gas cost)

Investment = 0.7 Lakhs

Simple Payback = 2 Months