The Madras Aluminium Company Limited
Mettur Dam, Salem

Unit Profile

The Madras Aluminium Company Limited, known as MALCO was promoted by Mr.R.Venkatasamy Naidu group of companies in collaboration with M/S Montecatini of Milan, Italy in the year 1961. MALCO was the third unit in India to extract primary Aluminium from Bauxite Ore. It is one of the few integral complexes in our country today and is the only primary Aluminium manufacturing industry in the state of Tamilnadu.

The factory and the registered office are located at Mettur Dam R.S, Salem District, Tamilnadu at latitude 11^{o} 55' N and longitude 77^{o} 55' E. MALCO is 45 km from Salem, 150 km from Coimbatore, 200 km from Bangalore and 360 km from Chennai.

MALCO is strategically located on account of its proximity to Water Resource (Stanley Reservoir) and Bauxite Mines at Yercaud (85 km) and at Kolli (150 km). A Captive Power Plant (CPP) is available to meet the Electrical Power requirement..

MALCO is one of the very few companies in India, certified for compliance with the three Management Systems viz., ISO 8001 for Quality Management System ISO 14001 for Environment Management System and OHSAS 18001 for Occupational Heath and Safety Management System.

The operations of MALCO have been grouped under the following three heads.

1. **SBU 1- Alumina Plant** where Alumina is extracted from the Bauxite Ore (Bayer's Process).

2. **SBU 2 -Aluminium Plant** where Aluminium is produced by the electrolysis of Alumina (Hall Herault Process).

3. **SBU 3- Captive Power Plant** where Electrical Power is generated using Coal as fuel.

Energy Consumption

Description	Unit	2003-04	2004-05	2005-06
Annual production of Aluminium Trihydrate	Tons/year	67872.73	81791.97	83148.62
Total Electricity Consumption/annum	Lakhs Kwhr	195.62	208.78	198.84
Specific Energy Consumption - Electrical	Kwhr/ton	288.22	255.26	239.14
Total Thermal (Fuel) Consumption / annum	Mcal/year	229537	231865	245347
Specific energy consumption- Thermal (Fuel)	Mcal/ton	3.38	2.84	2.95

Year	Electricity		Thermal (Fuel)	
	Kwhr/ton	% reduction over 2003-06	Mkcal /Ton	% reduction over 2003-06
2003-04	288.22	-	3.38	
2004-05	255.26	11.45	2.84	16.16
2005-06	239.14	6.27	2.95	-3.87

Energy Conservation Commitment, Policy and Set up

MALCO is committed to conserve Energy and the policy of the company reflects the same. (Company policy attached at the end of this Annexure C).Continual improvement is the way of life at MALCO.

Going beyond the requirement of compliance, MALCO is working on reaching Excellence in every sphere of its activities.

By providing a strong platform for its employees to use various tools like QC, TQM and Six Sigma, MALCO ensures, encourages and nurtures employee involvement and team work.

Various initiatives and contribution by the teams working on Energy Conservation yielded very good results.

MALCO Management is extending support by facilitating Energy Audits, reviewing progress of the teams, providing financial support, removing bottle-necks, recognising and rewarding efforts of the employees.

Creating awareness on Energy Conservation by organizing Energy Week Celebration and Competitions (Essay writing, Slogan writing , Posters painting, Paper presentation, Quiz competition) on Energy Conservation, MALCO is setting an example to the industries around.

There is separate Energy Cell consisting of a Energy Manger , supported by team members from various departments, functioning in MALCO and the Energy Manger is responsible for

- Finalising targets for energy conservation for the year in consultation with the members
- Enhancing the awareness on energy conservation among employees
- Organising brain storming with a cross functional Operators/Engineers to get ideas for energy conservation
- Forming task force teams
- Facilitating and guiding teams to accomplish the goals agreed upon
- Reviewing progress
- Ensuring course correction if needed
- Reporting to top management on the improvements made and critical bottlenecks, if any.

Energy Conservation Achievements

MALCO has implemented about 20 major energy conservation projects and other small projects with the initiatives taken by employees. Approximately 242 lakhs has been invested with an saving of 325.74 lakhs between 2003-06. **2005 –06**

a)Electrical Saving

The major Electrical Energy Consumption reduction was achieved by installation of Variable frequency drive.

Methodology :

Identified the areas and implemented auto control system, where manual controlling is done through valve throttling.

VFD STUDY AT ALUMINA PLANT						
Area	**Code**	**KW**	**Savings/Day**	**Type of Control**	**Previous Control**	**Remarks**
2031 A	PC1,2	30	336	Auto	Auto Control valve	Erected new VFD & Connected the control to flow
2028	PC1,2	132	700	Auto	Auto Control valve	Removed 1 no of control valve & connected the control to VFD
2030	PC1,2	90	250	Auto	Manual Valve	Erected new VFD & Connected the control to tank level
2036	PC1,2	45	408	Auto	Auto Control valve	Erected new VFD & Connected the control to flow
2036	PC4,4A	30	336	Auto	Auto Control valve	Erected new VFD & Connected the control to flow
2036	PC 5,6	45	384	Manual		Erected new VFD
2034	FR 1,2,3,4,5	5.5	84		Eddy Current	Replaced the old eddy current drive with energy efficient VFD
2034	PC 2	58	576	Manual	Valve	VFD Trial with flow control through manual controller
2031 A	P 7,8	110	480	Manual	Valve	VFD Trial with flow control through manual controller
Total savings			**3554 units / day**			

b. Thermal Savings

Project 1
Title : Drum filter Return filtrate heating by flash vapour

Before :

Drum filter Return filterate liquor will be collected in Pulping tank and heated to 75 deg.C by direct addition of steam

After:
Drum filter Return filterate liquor is heated by flash vapour using NPA
(one idle Shell and tube Heat exchanger was modified to suit this purpose)
Investment : Rs 50,000/-

Savings : 7 lakhs/year

Project 2

Title : Hydrojetting of all Ruth heat exchanger

Before : Every S& T HE,after scheduled isolation,it will be given Acid wash and cleaned using manula gutter

After : By switchover to Hydro jet ,Cleaning of HE scales become easier and time of cleaning reduced

Investment : 3.5 lakhs
Savings: 32 lakhs / year

Project 3

Title : Insulation for necessary pipelines & equipments

Before : Thermal insulation of New equipments and damaged insulation

After: Thermal insulation of new equipments and damaged insulation was renewed for 2000 m2

Investment : Rs 7 lakhs
Savings : 36 lakhs / year

Project 4

Title : Installation of new Evaporator body

Before : Four body operation of Evaporator
After : Installation of New evaporator Body done to operate Five Body operation and reduce specific consumption.

Savings : Rs 18 lakhs/year
: 18 lakhs /year

Project 5

Title : Installation of Hybrid Filter

Before : Three Drum Filters (3 x 25 m^2 of filter area) and one Disc Filter (1 x 108 m^2 of filter area) with a capacity of 7.5 MT/hour of Alumina Hydroxide operated with four vacuum pumps consuming 73 units of power per MT of output (Annual consumption of energy was 5.0 million units

After : One Hybrid Filter (20 m^2 of filter area) and one Disc Filter (54 m^2 of filter area) with a capacity of 9.5 MT/hour of Alumina trihydrate operated with three vacuum pumps consuming 45 units of power per MT of output (Annual consumption of energy was 3.7 million units)

Investment : 20 lakhs
Savings : 15 lakhs / year

Energy Conservation Plans & targets:

Energy Conservation Measures (Planned)	Anticipated savings		Approx. investment (Rs.lakhs)	Project Commencement & Completion year	
	In Fuel/ Energy	Rs. Lakhs			
Insulation of pipelines & equipments	60 tons of coal / year	2	2	Jul-06	Oct-06
Replacing ordinary asbestos gasket with spiral wound gasket in steam flange gaskets	50 tons of coal / year	1.65	1	Aug-06	Nov-06
Strong soda heat exchanger circuit modification	3338 tons of coal / year	108	Nil	Sep-06	Nov-06
Balancing supply & demand of Compressed air	7.3 lakhs Kwhr / year	13.14	19	Sep-06	Jan-07

RECOGNITIONS & REWARDS (EXTERNAL)

Award/Certifications Received	Awarded /Certified By	Year
Golden Peacock Innovation Award	Institute of Directors	Oct 06
State Safety Award	Inspectorate of Fcatories , Government of Tamilnadu	Sep 06
Corporate Environmental Award - First Prize	TERI	Jun 06
Commendation Award for strong commitment towards Sustainable Development	CII	Apr 06
Leadership and Excellence in SHE – 2005 -Southern region - Third Position	CII	Feb 06
Excellent Water Efficient Unit- 2005 - National Level	CII	Dec 05
Best Social Work Award	Ministry of Social Welfare, Govt of Tamilnadu	May 05
Appreciation & Distinguished Award (14th chapter convention in Quality Circle 2004)	Quality Circle Forum of India	Jul 05
Excellent Energy Efficient Unit	ENFUS	Oct 03
Excellent Energy Efficient unit	CII	Dec 02

Environment

Initiatives

POLLUTION OF	CONTROL MEASURE IN PLACE
Air	Bag Filters, Scrubbers,**Dustless Loading Spout,ESPs**
Water	Treatment Plants (STP, Gas Washing,Neutralisation System -DM Plant)
Land	**Secured Landfill**

Solid Waste	**Disposal for effective Utilisation**

Monitoring

Third Party -Monitoring

FREQUENCY	MONITORING OF
weekly	Ambient Air
	Stack Emission
Fortnightly	Noise Level
Monthly	**Forage Fluoride**
	Effluent
	Ground water

Online Monitoring

PARAMETER	EMISSION / EFFLUENT
SPM	Captive Power Plant, Coke Crusher, Kiln
NOx,SO_2, CO	Captive Power Plant
TDS, pH	Final Effluent

Improvement Projects

PROJECT	YEAR	INVESTMENT (Rs Lakhs)
Water Conservation - Reduction of water consumption by 2000 m3/day -Cooling Tower	**2005**	**5.00**
Improving Ewnvironment around Ash Silo - Dust Collection System	**2005**	**0.20**
Wealth from Waste - Effective utilisation of Red Mud (process waste) and Fly Ash in Cement manufacturing	**2005**	**NIL**
Reducing generation of spent pot lining (Hazardous Waste)by 50 % from electrolytic cells by ensuring operating parameters within narrow bandwidth	**2005**	**NIL**
Energy Conservation - Reduction of energy consumption by 4520 units/day- VFDs & Efficient Fan, Back pressure Turbine	**2005**	**47.50**
Improving APC Measures - Pulse Jet Bag Filters, Exhaust System and Roof Extraction Ventilators, On-line SPM monitors	**2005**	**25.00**

Contribution to Society

- Campaign - Ban use of throwaway plastics
- Distribution of Aluminium Kudam in lieu of plastic one
- Distribution of saplings in clothe bags
- De-silting/De-weeding of Yercaud lake
- Providing Dry Scrubber to improve fume extraction efficiency – Rs 162.5 million - 4.12 % of turnover
- Supply of drinking water to nearby villages
- Nearby farmers encouraged to use waste water discharge for irrigation
- Rally by MALCO School Children-Rain Harvesting•Quiz on Environment

Best Practices

- **Strong focus on Conservation of WATER, ENERGY & RAW MATERIALS in Business Planning**
- **Formation of teams/task force to implement various improvement projects**
- **Disposal of waste materials for effective utilisation**
- Training,Quiz, Competitions, Monthly Newsletter, Display Boards to enhance awareness on Environment
- Green MALCO
- Motivation by recognition
- Compliance with Environmental legislation

Safety

Initiatives

HEADING	DETAILS	PURPOSE	HIGHLIGHTS
PPE	Use of appropriate safety gadgets	Reducing impact of accident /Protection from injuriry	**Use of safety belt with two life-lines - During truss work, ensuring minimum of one support line while moving from place to place**
Contractor-Safety Compliance	Review of safety aspects of Eqiupment/Hand Tools PPE used by contractors	Ensuring safety	**Check-list/ Internal certifications for equipment safety**
Change Management	**Change Committee Approval for any change in existing design/addition of new equipment from SHE perspective**	**Addressing Safety , Health and Environment concerns**	**Change Committee's evaluation before-hand,thereby eliminating SHE hazards, if any**

HEADING	DETAILS	PURPOSE	HIGHLIGHTS
Audits	Hazop Study	Identification of hidden hazards present in the process	Removal Hazards by providing control measures
	Guards, Staircases, Handrails	Identification of lapses	Lapses corrected

	Interlock	Assessing effectiveness of interlocks	100 % functioning observed
Controls	Work Permits	Ensuring safe working condition	Safe Execution of jobs
	Safety Protocol	**Ensuring safety in high risk jobs**	

Improvement Plan

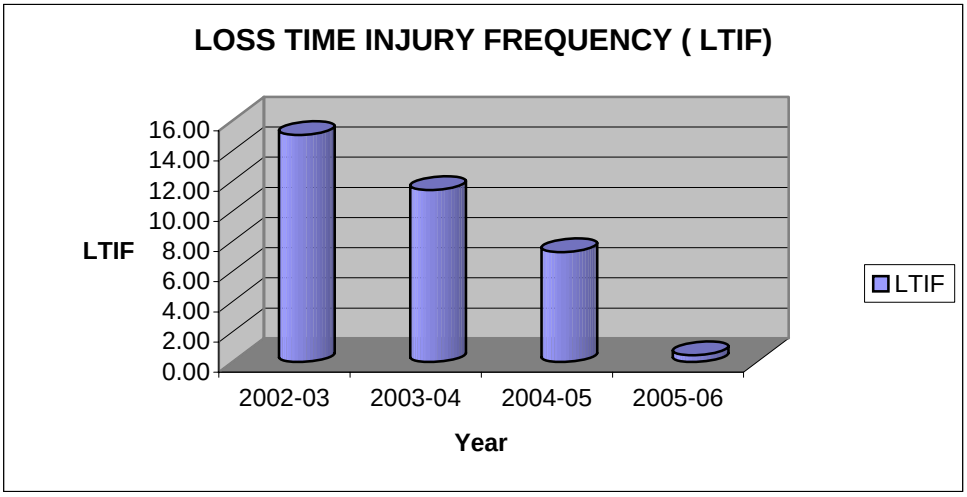
ENHANCING	INITIATIVES TAKEN
Involvement	Safety Committee consisting of operators and management staff
	Nomination of Safety stewards
Motivation	**Memento & Certifiacte to Safety Stewards**
	Safe Employee Award – once in two months
	Awards for Best Safety Slogan- monthly
	Awards for Best Cartoon on safety - yearly
Exposure	**Seminar on Accident prevention involving nearby industries**
	Safety Exhibition organised
Awareness	Class Room Training for employees and contract workmen
	Video Projection on safety
	Handouts/Handbook
	Visit to other units
	Display of Safety Slogans/Instructions
	Demo
	Mock Drills
	National Safety Day / Fire services Day Celebrations
Knowledge	Safety Quiz - Employees/Family Members/School Children
	Newsletter – monthly (Jan-06 - 61st issue)
	Sharing information on safety through soft copy

Safety Improvement Projects

PROJECT	YEAR	INVESTMENT (Rs Lakhs)
Improving Material Handling Safety- Introduction of systems and controls, camera monitoring,over-speed & reverse alarms, check-list for each type of material handling equipment	2005	0.64
Improving work-place safety by providing Chlorine Detector Alarm at Water Reservoir & Cooling water pump chamber	2005	1.18
Ensuring 100 % safety at 110 KV Switch Yard by providing a electrical earth switch interlocking system in place of manually operated system	2005	1.90

Prevention of accidents by improving SOP/WI - Procedure for making SOP/WI redefined- Operators involved in making SOP/WI	2005	NIL
Hazop Study	2004	1.00

Loss Time Injury Frequency (LTIFR)



Best Practices

- Change Committee approval for any change in design/process & addition of new equipment
- Safety First concept- addressing safety as a first topic in all meetings
- Linking Incentive to safety performance
- Safety Stewards teams addressing key safety issues to ensure highest level of safety standards
- Specific Safety Protocol System to ensure safety of high risk jobs
- Exhibition, Seminar, Competitions, Visual Displays, Monthly Newsletter, Celebrations – National Safety Day & fire Services Day to enhance safety awareness

S.No	Title of the Project	Background of the project	Observations made	Technical and Financial benefits of the project	Impact of Implementation
1	Providing VFD's for 2 weak soda pump,1 strong soda pump, 2 Aluminate Pump & 2 Wash Liquor Pump	Reducing the impact of valve throttling	Identified the areas where valves are frequently throttled / Permanently in throtled position.Calculated the power consumption wasted because of the throttling and intially identified the areas where the amount of saving is much higher.	Based on the savings we selected the projects with an payback below 15 months and implemented the projects immediately	Huge reduction in the sp power consumption and reduction in the failure of pump due to variation in the RPM

2	Installation of additional evaporator body to increase steam economy by having 6 body operation	Low steam Economy in Five effect operation	Lower Evaporation rate leads to reduction in Output liquor concentration	Coal savings : 515 MT per Annum. Increased Soda recovery.	Steam Consumption reduced through increased Heat transfer in Plate heat exchanger with 18.00 lakhs savings/month.
3	Installation of plate heat exchanger back wash system to increase steam economy	Low Heat transfer in PHE	Low Temperature pick up in Cold stream side	Coal savings : 173 MT per Annum. Better process control in precipitator.	Steam Consumption reduced through increased Heat transfer in Plate heat exchanger with 6.00 lakhs savings/month.
4	Incorporating pan filter by replacing old drum filter and also using dewatering agent to reduce moisture in Alumina hydrate thereby reducing the furnace oil consumption	High % of moisture in Alumina hydrate	Higher moisture resulting in Higher furnace Oil Consumption	F.Oil savings : 83 KL per Annum. Better Operational control	Moisture reduced to 5 % in Alumina Hydrate.
5	Burner nozzle modification to reduce furnace oil modification	Inefficient Burner nozzle	Higher furnace Oil flow through ineffectively design nozzle	F.Oil savings : 166 KL per Annum	F.Oil consumption reduced to 109 Lit/T