ASSOCIATED MOTORWAYS LIMITED

COMPANY DESCRIPTION

Associated Motorways Limited (AMW) is a privately owned group of companies located in a main rubber growing area Kalutara in Sri Lanka. The company was established in 1949 with a US$ 22 million turnover in 2002-2003. AMW is one of the leading rubber products factories in Sri Lanka producing tyres and retreading small to large tyres using cold and hot processes. The installed annual retreading capacity of the hot process is 400,000 tyres and of the cold process 135,000 tyres. Annual production of the main products is as follows:

- Retreading – Hot 120,000 tyres
- Retreading – Cold 46,000 tyres
- Vaerling process 55,000 tyres
- Compounding 9,600 tyres
- Tyres manufacturing 4,000 tyres
- Rubber products 600 tons

AMW has a work force of 700 and works on a three-shift basis for six days a week. The company is ISO 9000 certified and already started with the implementation of Cleaner Production options through Small and Medium Enterprise Developers (SMED) in 2000. Management decided to joint the GERIAP project for the following reasons:

- Continuously reduce energy costs because energy in Sri Lanka is expensive
- The company is committed to mitigating environment pollution and green the supply chain
- To find innovative solutions and introduce non traditional energy sources
- Comparing energy use with similar companies through a bench marking exercise

PROCESS DESCRIPTION

The company consists of a large number of subsidiary factories using different processes to manufacture and retread tyres and to manufacture rubber products.

- ***Material preparation:*** The common process for most of the factories is material preparation. Raw rubber, mostly in the form of sheets (RSS), is mixed with additives in a Bambury mixer or calendar.
- ***Tyre making:*** Tyre manufacturing for small vehicles consists of several steps:
  - Main process – tyre making: Raw rubber compound is warmed, cut and conveyed to an extruder where it is formed into flat sheets. The tyre is built on a mould using the rubber sheets.
  - Sub process 1 - Bead wire ring making
  - Sub process 2 - Bias cutting process
  - Sub process 3 - Air bag making
- ***Tyre retreading – Hot process:***
  - Initial inspection
  - Buffering
  - Application of new rubber
  - Vulcanization
  - Final inspection
- ***Tyre retreading - Cold process:*** This process is performed below 100^0C. The tread used in this process is cured before retreading and fixed on the carcass.

The draft Company Energy Efficiency Methodology was used as a basis for the plant assessment to identify and implement options to reduce energy and other materials and wastes. Some of the interesting experiences are:

- ***Task 1c – Pre-assessment to collect general information***

As part of the pre-assessment an overview of existing meetings was made where energy and environment is discussed, which can be used at a later stage to communicate about the energy assessment and the results. See table below.

Lesson learnt: An overview of existing meetings can be useful to communicate to management and staff about the energy assessment (task 2a) and results (task 5b and 6a)

Meeting name	Frequency & duration	Attended by	Topics covered
Budget meeting	Once a month	GM, Departmental heads	All matters connected with monthly and annual budgets
ISO 9000- 2000 steering committee meeting	Once in three months	MR, GM, Departmental heads	Relevant to ISO 9000
Management review meeting	Once in six months	GM, Departmental heads, Supervisory staff	ISO 9000 and other
Meeting with the employees	Weekly	Departmental heads, Employees	General departmental work
Departmental meetings with the heads	Daily	GM, All Departmental heads	Related to budget (production plan)
Sectional meeting on Projects	Twice a week	Factory Manager Project Engineer Sectional Heads	Energy / CP related projects

- ***Task 4a – Technical, economic and environmental evaluation of options***

The location of and distance between the different departments affected the technical and financial feasibility of some of the options. One striking example is the large distance between the boiler and the burner (RPD).

Lesson learnt: The layout of the departments can be an important factor in the feasibility analysis.

- ***Task 5b – Evaluation meeting with top management***

At the evaluation meeting with top management of this company, the external facilitators praised the company that the General Manager was available for discussion and evaluation at the beginning and at the end of each visit. This greatly contributed to the success of the assessment ad implementation of options. This high level of commitment from top management also was important to get support for future projects to continuously improve energy efficiency (step 6).

Lesson learnt: The ownership and top management support for future work is greatly improved if top management has been involved throughout the assessment process.

- ***Step 6: Continuous improvement***

The company has taken several initiatives to ensure energy efficiency improvements will continue. Some important ones are:

- Appointment of a Project and Development Engineer to focus on energy management
- Increased communication to factory staff about energy efficiency options and assessments
- Participation of top management in meetings on Cleaner Production and energy efficiency organized by SMED and NCPC in Sri Lanka to show their true commitment
- Agreement to be a demonstration plant as part of a 10-day training programme on Cleaner Production and energy efficiency

OPTIONS

- The focus areas selected were:
  - Boiler and steam distribution system: five options identified and four implemented
  - Compressed air production and distribution system: three options identified and still under investigation
  - Rubber Products Division (RPD), where numerous options were generated:
    - Main tyre making: 13
    - Bead wire process: 11
    - Process cutting: 74
    - Air bag making: 8
  - Electricity supply system

- For six of the implemented options for which results were measured (see table below), the total investment costs were US$ 49,080, annual savings were US$ 84,764 and total payback was 7 months
- For options implemented, the total energy reductions were 521 MW and 173 kilo-liters furnace oil per year resulting in 607 ton CO2 emission reductions per year

Table: EXAMPLES OF OPTIONS IMPLEMENTED

FOCUS AREA/ OPTION	CP TECHNIQUE	FINANCIAL FEASIBILITY	ENVIRONMENTAL BENEFITS	COMMENTS
Compressed air supply system: Replacement of inefficient compressor with two screw type compressors (see case study)	New equipment/ Technology	▪ Investment costs: US$ 29,500. ▪ Operating costs: lower than in old situation but not quantified ▪ Cost savings: US$ 43,137 /yr ▪ Payback period: 8 months	▪ Electricity saving: 500 MW/yr ▪ GHG emission reduction: 102 tCO_2/yr	Working environment in the compressor room has improved due to lower noise and ambient temperature levels
Boiler and steam distribution system: Improved steam system efficiency through: ▪ **Boiler maintenance** ▪ **Leak repairs** ▪ **Pipeline insulation** (see case study)	Good housekeeping	▪ Investment:: US$ 13,400 ▪ Cost savings: US$ 22,315 /yr ▪ Payback period: 7 months	▪ Furnace oil savings: 98,400 l/yr ▪ GHG emission reductions: 303 tCO_2/yr ▪ Reduction of NO_x, particulates ▪ Water reduction	The implementation of these options will continue as part of a steam management program

FOCUS AREA/ OPTION	CP TECHNIQUE	FINANCIAL FEASIBILITY	ENVIRONMENTAL BENEFITS	COMMENTS
Boiler and steam distribution system: Recover heat from boiler flue gas to preheat combustion air (see case study)	Production Process/ Equipment modification	▪ Investment:: US$ 300 ▪ Cost savings: US$ 600 /yr ▪ Payback period: 6 months	▪ Fuel savings: 1,044 l/yr ▪ GHG emission reduction: 3.2 tCO_2 /yr	Option is being implemented The company boiler room and maintenance staff were involved in the installation
Rubber Products Division (RPD): Insulation of ▪ **Steam Pipelines** ▪ **Tyre moulds of Vulcanization/Curing Process** (see case study)	Good Housekeeping	▪ Investment=US$ 1,480 ▪ Cost savings: US$ 1,380 ▪ Payback period: 1 year	▪ Furnace oil savings: 6,000 l/yr ▪ GHG emission reduction: 18 tCO_2 /yr	The company is continuously repairing insulation and leaks Working conditions improved due to reduced heat loss
Rubber Products Division (RPD): Condensate recovery (see insulation of steam pipelines / moulds case study)	New Technology/ Equipment	▪ Investment: US$ 3,200 ▪ Operating costs: US$ 1,200 ▪ Cost savings: US$ 15,456 /yr ▪ Payback period: 4 months	▪ Furnace oil saving = 67,200 liters/yr ▪ GHG emission reduction: 207 tCO_2/yr	The company implemented this option but all figures are still expected costs and savings
Rubber Products Division (RPD): Compressed air leak survey and leak repair (see case study)	Good housekeeping	▪ Investment:: not quantified but very low ▪ Operating costs: ongoing ▪ Cost savings: US$ 1,876/yr ▪ Payback period: estimated 1 month	▪ Electricity savings: 21,432 kWh/yr ▪ GHG emission reduction: 4.4 tCO_2/yr	
Rubber Products Division (RPD): Electricity saving through waste reduction of nylon thread and rubber compound	Good Housekeeping	▪ Investment: not provided ▪ Cost savings: US$ 1,977 ▪ Payback period: not provided	▪ Electricity savings: 28 MW/yr ▪ GHG emission reduction =5.7 tCO_2/yr	Not yet implemented: all figures are expected costs and savings. Preliminary energy audit completed
Electrical Supply system: Installation of load demand indicators	New Technology/ Equipment	▪ Investment: not provided ▪ Cost saving: US$ 6,336 ▪ Payback period: not provided	▪ Energy savings: 2112 kVA	Not yet implemented: all figures are expected costs and savings. Preliminary energy audit done
Electrical Supply system:	Improved Process Management	▪ Investment:: not provided (for	▪ Demand peak reduction: 2,620	Not yet implemented: all

FOCUS AREA/ OPTION	CP TECHNIQUE	FINANCIAL FEASIBILITY	ENVIRONMENTAL BENEFITS	COMMENTS
Power demand management and installation of electricity sub meters at Bambury Mixer		meter) ▪ Cost saving: US$ 7,920 ▪ Payback period: not provided	kVA ▪ Energy savings: none ▪ GHG emission reductions: none	figures are expected costs and savings. Preliminary energy audit done

FOR MORE INFORMATION

GERIAP National Focal Point (NFP) of Sri Lanka
Mr. Nihal Cooray, Manager
Small and Medium Enterprise Developers (SMED)
Level 4, No. 53, Vauxhall Lane
Colombo 02, Sri Lanka
Tel: +94 1 304287, Fax: +94 1 304291
E-mail: projsmed@slt.lk

GERIAP Company in Sri Lanka

Mr. Ananda Caldera
Director General Manager (Factory)
Associated Motorways Ltd
Nagoda, Kalutara, Sri Lanka
Tel: +94 34 2222386 / 2222437
Mobile: +94 777 891611