PT SEMEN PADANG

COMPANY DESCRIPTION

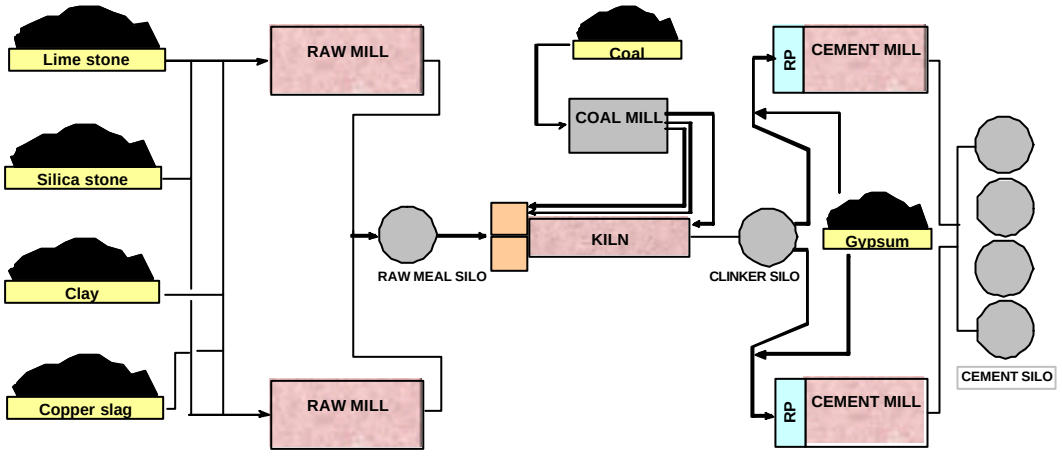
Established in 1910, PT Semen Padang is the oldest cement plant in Indonesia. The plant is located in Indarung, Padang, West Sumatra, Indonesia, about 200 meters above sea level, and approximately 13 kilometers from the seaport of Teluk Bayur, Padang. It has five plants with a total capacity of 5,240,000 tons per annum and has 2,376 employees as of April 2003.

PROCESS DESCRIPTION

The main process in a cement production plant has three stages: raw meal production, clinker production and cement production. These are explained below.

- ***Raw meal production:*** The process for raw meal production requires vertical or tube mills as the main machines for grinding and drying. Material input are limestone, silica stone, clay, cooper slag with their composition and the product is raw meal. Energy input are electricity for grinding and hot gas (kiln exhaust gas) for drying. This process discharges raw meal dust which are collected by electrostatic precipitator.
- ***Clinker production:*** Here, the main machine is a Kiln. The Process involves calcinations, clinkering at a temperature of 1400 degree Celsius and cooling. Material inputs are raw meal and coal as fuel. This process discharges clinker dust which is collected by electrostatic precipitators and hot air is emitted.
- ***Cement production***: Here, the main machines are tube mills for grinding clinkers and gypsum. The mill system consumes electricity for driving the equipment. This process discharge cements dust which is collected by electrostatic precipitators.

Figure 1. Process flow diagram for PT. Semen Padang



METHODOLOGY APPLICATION

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 1a – Meeting with top management***

Throughout the GERIAP project, top management was available to meet with the Team, BPPT (the external facilitators for the project in Indonesia) and the international consultant during each visit. This demonstrated a strong interest in the project and energy efficiency in general and inspired and motivated the Team enormously

Lesson learnt: Top management's availability to meet with the Team on a regular basis is an important motivating factor.

- ***Task 1b – Form a team and inform staff***

Top management appointed the Production Director as the Team Leader. In addition to a Team for the energy assessment at company level, small teams were also formed for the four plants (named II, III, IV and V) separately. This structure made it easier to carry out the energy assessment at the different focus areas.

Lesson learnt: It can be useful to create smaller teams, in order to effectively carry our energy assessments for different focus areas or departments.

- ***Task 1e – Prepare assessment proposal for top management approval***

The company launched a "Total Productive Maintenance" (TPM) programme that aims to improve production output and profits. The energy assessment through Cleaner Production was carried out as an extension of the TPM programme.

Lesson learnt: Find out if the energy assessment can be carried out as part of wider production improvement programmes, which will make it easier to obtain top management approval.

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

A simple payback period of less then two yrs is the minimum criteria options had to meet to be accepted by management, so this was used as an important input for ranking feasible options. For example, an option to reduce coal consumption was not financially feasible because it had a payback period of ten yrs. However, options that were considered to be necessary from an environmental or safety perspective (e.g. to meet regulatory permit requirements) were ranked for implementation in the short term regardless of their payback period.

Lesson learnt: Any criteria given by management is essential input in the ranking of feasible options.

- ***Step 6 – Continuous improvement***

The company did a lot of work in the past to improve energy efficiency, such as optimization of the kiln and cement mill in the Indarung II plant, replacing the airlift by a mechanical conveyor in the Indarung III plant, and upgrading the cement mill in the Indarung III plant. This indicates that top management's commitment to continued energy efficiency improvement is real. One concrete measure that has been taken since the GERIAP project is the formalization of the Team and specifying its roles and responsibilities: monitoring energy consumption per unit of project to identify ways to improve energy efficiency, meeting periodically to discuss technically problems at the four plants, and to take action to solve identified problem in relation to energy and environment.

Lesson learnt: Past energy conservation projects are a good indicator to know if the company is serious about continuing with energy efficiency improvements in the future.

OPTIONS

- There are seven options identified from the three focus areas: (1) Compressed air, (2) Kiln and (3) Fans.
- The selected five options chosen by the team and that were implemented are: compressor configuration, bag-house air jet pulse control, compress air leaks, false air and variable speed drive. The details can be seen in the table below.
- The two options which are not implemented are as follows:
    - Coal Mixing: This option is technically and environmentally feasible, but this option is not implemented because it requires big investment and the payback period is about seven to ten yrs of technical life time.
    - Refractory Lining: This option is not implemented because it requires the production process to stop. The company cannot afford to do this. Hence this option is on hold.
- The total investment costs for the five implemented options were US$ 19421, annual cost savings are US$ 423287, and the payback period was 6 months.
- Total electricity savings are 1283744 kWh/year, coal savings are 11895 tons/year and greenhouse gas (GHG) emissions reductions are 30906 tons CO2/year.

Table 1: EXAMPLES OF OPTIONS IMPLEMENTED

FOCUS AREA/ OPTION	CP TECHNIQUE	FINANCIAL FEASIBILITY	ENVIRONMENTAL BENEFITS	COMMENTS
Compressed Air / Installation of interconnection between the compressors of kiln and cement mill to maximize compressor loads and efficiency	Production process / equipment modification	▪ Investment: US$ 1099 ▪ Cost savings: US$ 14480/yr ▪ Payback period: 1 month	▪ Electricity savings: 254523 kWh/yr ▪ GHG emission reductions: 184 tons CO_2/yr	Loading condition is increased therefore there is a compressor not operated
Compressed Air / Increase time intervals and/or replace time-based with pressure differential jet pulse controls in compressed air system	Good housekeeping	▪ Investment: nil ▪ Cost saving: US$ 593/yr ▪ Payback period: immediate	▪ Electricity savings: 10432 kWh/yr ▪ GHG emission reduction: 7.6 tons CO_2/yr	Adjustment of the cycle time can save compressed air
Compressed Air /	Good	▪ Investment: nil	▪ Electricity	Decreasing of

FOCUS AREA/ OPTION	CP TECHNIQUE	FINANCIAL FEASIBILITY	ENVIRONMENTAL BENEFITS	COMMENTS
Compressed air leak survey, leaks repair and staff campaign	housekeeping	▪ Cost savings: US$ 5,306	savings: 93277 kW/yr ▪ GHG emission reduction: 68 tons CO_2/yr	compressor loading and saving electricity energy
Kiln / False air leak survey and leak repair in kiln	Good Housekeeping	▪ Investment: US$ 18294 ▪ Cost savings: US$ 400637/yr ▪ Payback period: 2 weeks	▪ Electricity savings: 885600 kWh ▪ Coal savings: 11895 ▪ GHG emission reduction: 30617 tCO_2/yr	Leaks repairing will decrease fuel consumption
Fans / Increase fan pulley diameter to reduce fan speed instead of using dampers	Production process/ equipment modification	▪ Investment: US$ 28 ▪ Cost saving: US$ 2271 /yr ▪ Payback period: 5 days	▪ Electricity savings: 39,912 kWh/yr ▪ GHG emission reduction: 29 t CO_2/yr	The motor loading will decrease and it could save energy

FOR MORE INFORMATION

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