CEYLON HEAVY INDUSTRIES AND CONSTRUCTION CO. LTD (CHICO)

COMPANY DESCRIPTION

CHICO is the largest steel rolling mill in Sri Lanka, located at Oruwala, in the Colombo district. The mill was established as a government-owned "Ceylon Steel Corporation" with donations from the USSR government in 1961 and commercial production started in 1965. The mill was converted to a limited liability company in 1993 and sold to a Korean company in 1996. CHICO's workforce consists of about 665 staff, most of who work in the manufacturing line. CHICO manufactures mainly tor-steel and round bars, but also produces drawn wire, wire mesh, welding rods and foundry steel castings.

CHICO's production capacity is 96,000 tons per year and produced about 75,000 tons in 2004. The company now looks into new ways to improve productivity and product quality and participated in the GERIAP project to obtain knowledge about environmental protection and energy saving strategies. One concrete example is the discussion the company had during a GERIAP meeting with their fuel oil supplier about corruption practices, which resulted in the Sri Lanka oil refinery taking measures to minimize corruption practices affecting CHICO and other clients in Sri Lanka. In addition, the company's team received in-house training, which motivated the team to improve energy efficiency despite limited financial resources, and already has resulted in several options to reduce steam leaks. CHICO is looking forward to obtain further benefits through carbon trading and regional benchmarking in the future.

PROCESS DESCRIPTION

- ***Billet sizing:*** The company imports billets of various sizes (120mm X120mm, 100mm X100mm etc.) according to the best price / quality availability. The billets are cut into 2m length.
- ***Furnace heating:*** Billets are fed in two rows to the pre heating area of the reheating furnace. This furnace is a continuous and pusher type furnace (refer Figure 1), whereby billets are heated in three sequential heating zones (Pre heating zone, Heating zone and Soaking zone). The billets are heated up to 1200^{O} C and the average discharge temperature is1190^{o}C. The furnace is fired using furnace oil and the combustion air is pre heated using a recuperator. Cooling water is circulated through the furnace to cool down the skid pipes (refer Figure 1) on which the stock moves, and cooling water is recycled.
- ***Conveying:*** Red hot billets are pushed into a conveyor channel.
- ***Rolling:*** The thickness of the billets is reduced in seven steps at eight rolling stations or sets. Each of these roller sets is driven by a thyristor controlled DC motor and water cooled to prevent overheating.
- ***Cooling:*** Rolled products are cooled down on a walking beam conveyor. Electrical air blower fans are used from the bottom side of the walking beam conveyor to achieve the fast cooling rate.
- ***Sizing:*** End products are cut to size as per customer requirements
- ***Stretching and twisting:*** Products are stretched and twisted to achieve the correct straightness and the shape.

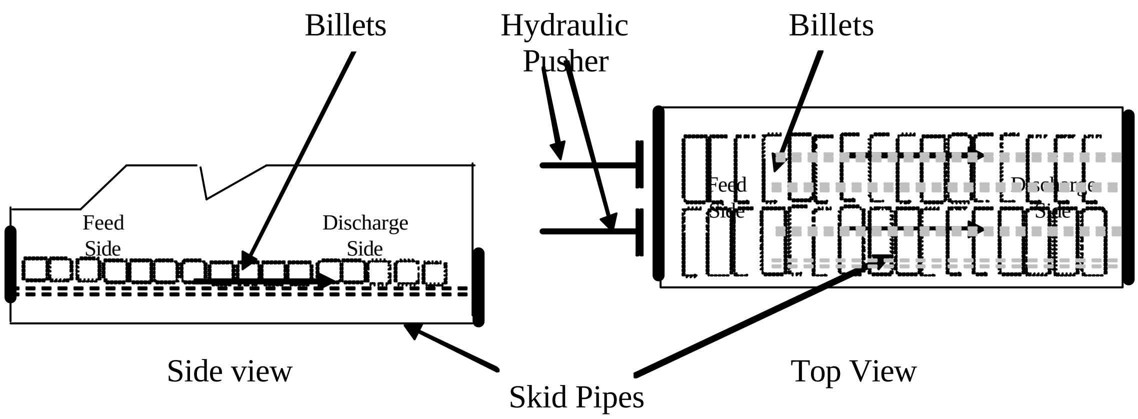

Figure 1- Billet Heating Furnace - Schematic

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

Once the Team was formed, a meeting was held to plan the pre-assessment. It was decided to start with a walkthrough of the plant, in which the whole Team participated, to identify possible focus areas. After the walkthrough the Team met again to decide which focus areas to select for the detailed energy assessment.
Lesson learnt: It is useful if all the team members participate in the walkthrough of the plant. This shortens the time to select focus areas afterwards.

- ***Task 2a – Staff meeting and training***

Staff at this plant received training during various stages of the project:

- Three technical staff attended a 5-day training programme delivered by SMED, who are the external facilitators for the GERIAP project in Sri Lanka
- A larger group of employees was selected, including three trainees, to received thorough training on Cleaner Production and energy efficiency
- Many staff participated in the one-day walkthrough of the plant, which was also attended by an international consultant who described typical energy losses and efficiency opportunities for the various equipments and departments
- A three-day training program was given to the Team on the draft *Company Energy Efficiency Methodology*
- A Roundtable with the other four Sri Lanka plants was held half-way during the implementation phase of options to exchange experiences and discuss successes and difficulties

Lesson learnt: A variety of training to a large group of company staff will increase the ownership of energy efficiency by staff and therefore increase the chance of successful energy efficiency options.

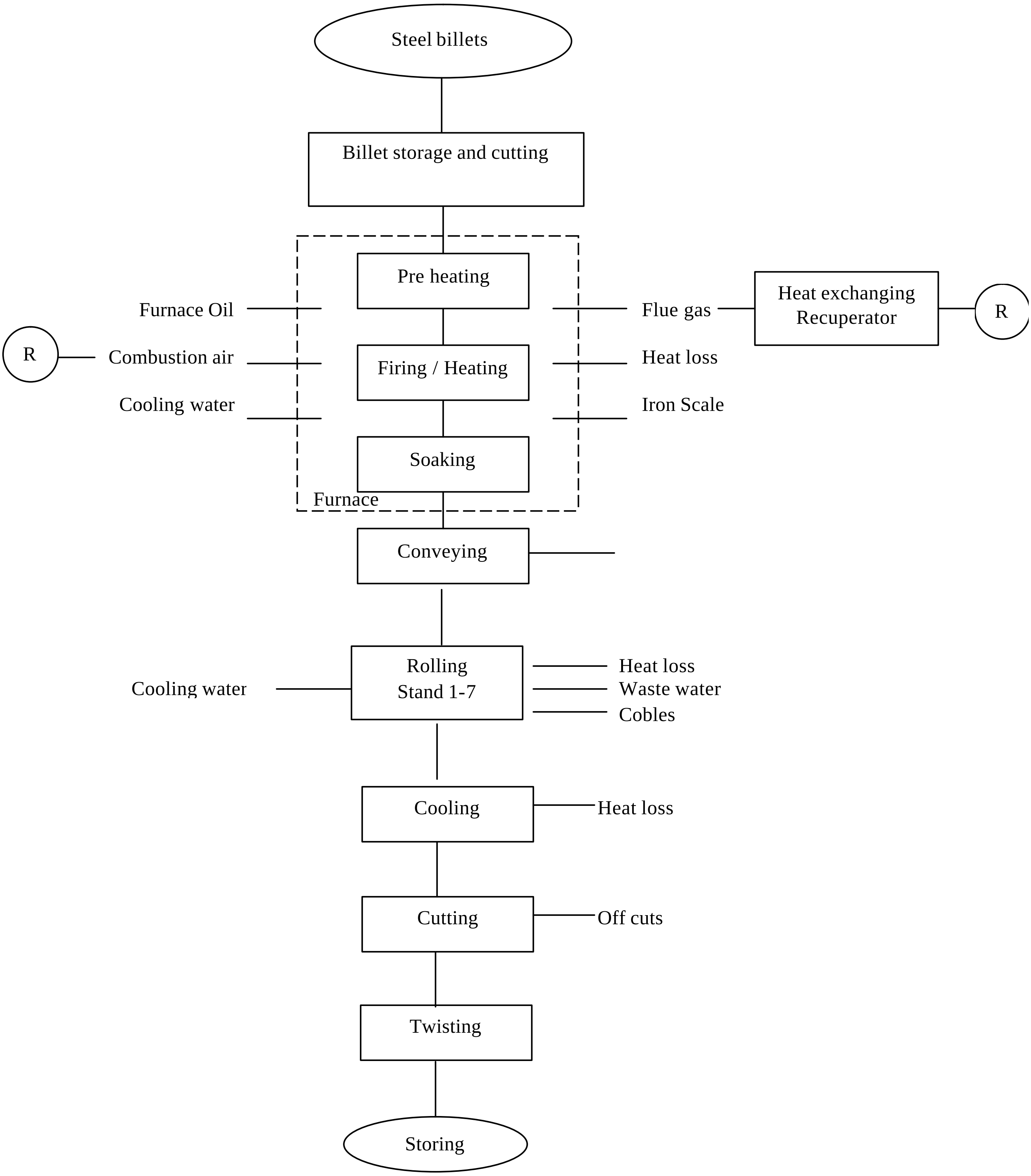

Figure 2 - Process flow diagram for CHICO

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

At this company the enthusiasm of the Team was remarkable and contributed a lot to achieve higher energy efficiency levels. However, due to the lack of a formal program to motivate staff to come up with new ideas, the overall process was slowed down. In addition, the lack of a government policy framework at national level on energy, the company does not receive external pressure from the government to improve energy efficiency. <u>Lesson learnt: Motivation programs for staff as well as external pressure by government are two important factors for the company to continue to improve their energy efficiency.</u>

OPTIONS

- The focus areas selected for the project were the diesel-fired tunnel/gloss kiln because it is old and inefficient and the electrical distribution system because electricity bills are high.
- A total of nine options were investigated, five options were implemented, and the results were measured for four options implemented
- For the four options implemented and measured, the <u>total</u> investment costs were US$ 58,032, annual savings were US$ 74,634 and total payback was 9 months
- For the five options implemented, the <u>total</u> energy reductions were 2 liters fuel oil per ton product and 1.8 kWh per ton product
- The plant's total emissions increased between 2003 and 2004 with 2203 tons CO2 as a result of a 25% increase in production. But the <u>specific</u> emissions (per ton of product) reduced. Therefore compared to the business-as-usual scenario, as a result of options implemented, the plant's GHG emissions were reduced by 444 tons CO2 between 2003 and 2004.

Table: EXAMPLES OF OPTIONS SUCCESSFULLY IMPLEMENTED

FOCUS AREA/ OPTION	CP TECHNIQUE	FINANCIAL FEASIBILITY	ENVIRONMENTAL BENEFITS	COMMENTS
Reduce production delays through improvement of fuel oil quality (see case study)	Improved Process Management, New Technology / Equipment	▪ Investment: none ▪ Annual savings: US$ 30,000 (in combination with nozzles and recuperator option) ▪ Payback period: immediate	▪ Fuel oil savings: 150,000 l/yr ▪ GHG emission reduction: 416 t/yr ▪ SO2 emission reductions ▪ Reduction in particulate emissions due to improved fuel composition	Production increase of 15,000 tons between 2003 and 2004 (for all options combined) Environmental savings combined with nozzles and recuperator option
Replacement of oil burner nozzles and recuperator tubes at furnace to reduce heat loss (see case study)	Good Housekeeping	▪ Investment: US$ 57,120 ▪ Annual savings: US$ 30,000 (in combination with oil quality option) ▪ Annual savings due to extended recuperator life time (3 years compared to 1 year previously): US$ 34,200 ▪ Payback period:	▪ Fuel oil savings: 150,000 l/yr ▪ GHG emission reductions: 416 t/yr ▪ SO2 emission reductions	Production increase of 15,000 tons between 2003 and 2004 (for all options combined) Environmental savings combined with oil quality option

FOCUS AREA/ OPTION	CP TECHNIQUE	FINANCIAL FEASIBILITY	ENVIRONMENTAL BENEFITS	COMMENTS
		less than one year		
Adjustment of burner air to fuel ratio using Flue Gas Analyzer	Improved Process Management	▪ Investment: US$ 912 ▪ Annual savings: US$ 984 ▪ Payback period: one year	▪ Fuel oil savings ▪ GHG emission reductions ▪ SO2 emission reductions	Environmental savings were not quantified
Reduce production delays through installation of high tension transformer for power supply (see case study)	Improved Process Management	▪ Investment: none ▪ Annual savings: US$ 9,450 ▪ Payback period: immediate	▪ Electricity savings: 135 MW ▪ GHG emission reductions: 28 tons CO2/yr ▪ Steel raw material reduction ▪ Iron oxide scale waste reduction	Production increase of 15,000 tons between 2003 and 2004 (for all options combined)
Power factor improvement in electrical distribution system		▪ Investment: not known ▪ Annual savings: US$ 28,800 expected	▪ Electricity savings: none (only costs) ▪ GHG emission reduction: none	Results for this option were not yet available at time of writing

FOR MORE INFORMATION

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