PROJECT OUTCOME

BLUESCOPE STEEL LIMITED

In March 2003 EPA commenced a partnership with Australia's leading flat steel manufacturer, BlueScope Steel Limited (formerly BHP Steel), with a Pilot Process Integration Study to identify opportunities and solutions to the company's environmental challenges at its Western Port operations in Hastings, Victoria.

In 2000 the company's Western Port facility was identified in the EPA Top 30 Project as one of the 30 largest generators of prescribed industrial waste in Victoria. It was invited to participate in a Pilot Process Integration Study, as it was recognized during initial site assessments that much of the issue surrounding prescribed industrial waste generation could be addressed by improving the integration of the processes.

By analysing and optimising the flow of materials, water and energy around the site, Parsons Brinckerhoff (PB) identified potential opportunities to:

- Reduce prescribed industrial waste formation
- Increase water and energy efficiency
- Improve reuse and recycling of existing process flows.

BACKGROUND (2004)

BlueScope Steel's Western Port facility is located near Hastings, approximately 80kms south-east of Melbourne. The primary facilities consist of a hot strip mill, pickle line, cold rolled mill, batch annealing circuit and temper mill, three continuous metallic coating lines and two paint lines. Western Port Works has annual production capacities of 1.5 million tonnes of hot rolling, 1.1 million tonnes of cold rolling, 850,000 tonnes of coating and 330,000 tonnes of painting.

The site currently produces a direct annual prescribed waste output (to landfill) of approximately 1500 tonnes. A waste audit showed that approximately 85 per cent of the prescribed waste sent to landfill from the site is filter cake from the water treatment plant. The bulk of this sludge is the direct consequence of precipitation of iron hydroxide as a result of dosing in the water treatment plant. The remaining 15 per cent comprises oily scale/process residues (from rolling mills) and chromium contaminated solid waste (such as gloves, overalls, etc).

Indirectly, the sludge produced from offsite processing of approximately 50,000 litres/week of spent pickle liquor (SPL) is also classified as prescribed waste.

THE PROCESS

The site comprises a Hot Strip Mill (HSM), Cold Strip Mill (CSM), Metallic and Organic Coating Lines, and other associated plants to produce cold rolled, metallic coated and organic finished sheet and coil products.

Slabs of steel, shipped from Port Kembla in NSW, are hot rolled by running the slab back and forth through large metal rollers at high temperatures. The coils produced are subsequently pickled to remove scale, and then cold rolled to achieve a strip that is in the order of 0.5mm thick and 6000m long. Following cold rolling, some strip is tempered and annealed. Alternatively the steel may be coated with either zinc (galvanised) or a zinc/aluminium mix (ZINCALUME steel). Organic finishes of either paint or PVC are also applied to some of the uncoated and metallic coated steel.

Water use is an integral part of the process and key areas such as the HSM and CSM are supported by their own water recycling systems. However, wastewater from these processes is treated by the water treatment plant (WTP) prior to discharge from the site into Western Port Bay, under the conditions of the site's EPA accredited licence.

THE INITIATIVE

Voluntary participation in the 2003 Pilot Process Integration Study provided BlueScope Steel with the technical innovation and support they need to commence implementing improvement opportunities.

These cleaner production initiatives include:

Water treatment plant (WTP) sludge

Composition analysis indicated that the filter cake is primarily iron hydroxide, with small amounts of other metal hydroxides. The majority of the iron precipitates result from neutralisation of the acidic streams with lime dosed in the WTP and the dosing of spent pickle liquor (SPL). In light of this, the approach taken focused on:

The large amount of iron salt losses can be traced to several specific plant areas or process issues, and could be significantly reduced, with substantial savings both in operating cost and environmental impact.

Potable water

Potable water use is approximately 900ML per year. Reduced consumption is an environmental benefit in itself, but would also assist in the overall reduction of flows to the WTP, and hence reduce the amount of filter cake formation. The study concluded that:

- Most unit operations require good quality water, limiting reuse potential.
- However some units, such as the front end of the Hot Strip Mill (HSM), could potentially use lower quality water, such as the blowdown stream from the HSM.
- The management of water flows in the HSM, which uses 49 per cent of potable water on-site, is not currently configured in accordance to its original system design. Modification (to the intended counter-current flow) could deliver water savings in the order of 200kL/day. Savings may also arise from automated control of HSM system water chemistry and blowdown rate.

Stormwater

Investigation into the potential for harvesting stormwater found that:

- Rainwater from roofs and paved areas would have a water quality similar to potable water and could be harvested.
- Rainwater that has flowed across fields and grassed areas will have a slightly higher solids and organic content, however it could be suitable for use in some process operations.
- Wastewater from the HSM currently flows into a stormwater collection pond near the Cold Strip Mill before being discarded to Westernport Bay. As this water is quite saline, the other stormwater collected in this pond is no longer suitable for reuse at the site. Stormwater harvesting would require segregated storages.

Energy

The site is a large energy user especially through furnaces in the process units, boilers and operation of the milling equipment. Energy efficiency in the course of this study was examined with respect to water streams related to solid waste formation.

The heat to be provided by steam was regarded as set by the process, however condensate use and the possibility of return to the boilers was examined for unit operations.

Spent pickle liquor (SPL)

A form of process analysis termed 'pinch' analysis demonstrated that the water balance of the Pickle Line is adversely affected by the use of direct steam injection for process heating. Steam injection leads to continuous loss of pickle liquor and is in excess of the recovery capacity of the Acid Recovery Plant. Replacement of this acid loss appears to be in excess of $2m per year.

Substantial losses could be avoided by minimising direct injection of steam or ceasing it altogether in favour of another method of process heating (for example indirect steam heating).

ADVANTAGES OF THE PROCESS INTEGRATION STUDY

Parsons Brinckerhoff made 22 recommendations for process improvements and assigned each an order of priority and cost estimate. These require more detailed study for optimisation, however the potential for economic and environmental benefits is substantial. It is expected that process improvements will be implemented in a step-wise manner.

BlueScope Steel demonstrated its commitment to cleaner production ideals by becoming a voluntary participant in the Pilot Process Integration Study, which was conducted on behalf of EPA by PB at EPA cost.

BENEFITS OF INTEGRATION APPROACH

In this case study, opportunities for water, energy and waste improvements were often interdependent and required an integrated analysis and innovative approach to devising solutions that were often not available if the problem was considered in isolation.

CONTACT DETAILS

For further information, contact:

Blue Scope Steel
Telephone: (03) 9666 4000
Internet: www.bluescopesteel.com

Business Sustainability Unit
EPA Victoria
Email: business.programs@epa.vic.gov.au
Telephone: (03) 9695 2722