



## Case Study: Minerals processing solutions

### Partnership and innovative solutions key to expansion of Cannington's flotation circuit

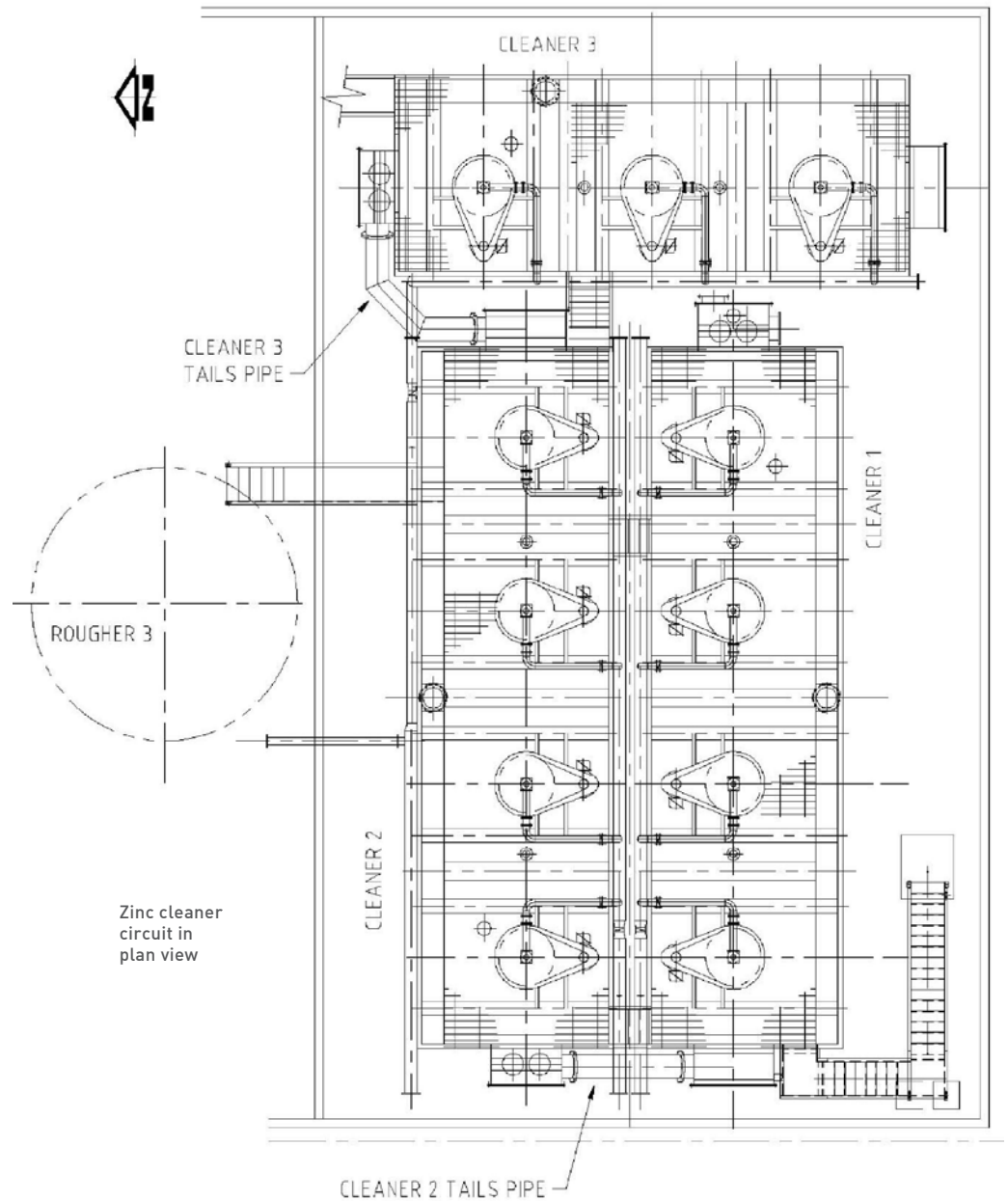
BHP Billiton's Cannington mine lies south east of Mt Isa in Northern Queensland, Australia. Cannington began production in 1997, following discovery of valuable deposits of silver, lead and zinc, and is presently the largest tonnage and lowest cost single mine producer of both lead and silver in the world.

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| <b>Organisation:</b> | BHP Billiton   |
| <b>Site:</b>         | Cannington, QLD, Australia   |
| <b>Year:</b>         | 2003   |
| <b>Application:</b>  | Lead/zinc flotation  |
| <b>Challenge:</b>    | Expansion of flotation circuit. Limited time, very limited footprint, no disruption to existing operations                         |
| <b>Solution:</b>     | Customized TankCell®   |
| <b>Key benefits:</b> | <ul style="list-style-type: none"><li>■ Projected budget reduced by 10%</li><li>■ Completed five weeks ahead of schedule</li></ul> |

BHP Billiton is the world's largest diversified resources company and is a global leader in the resources industry. With some 35,000 employees working in more than 100 operations, BHP Billiton occupies industry leader or near industry leader positions in most major commodity businesses.

In 1997, initial throughput at Cannington was 1.5 Mtpa, with production of two separate concentrates, lead/silver and zinc. By February 2003, following various milling and debottlenecking projects, Cannington had received approval to increase the sustainable capacity to 2.4 Mtpa. This significant growth in capacity, from a flotation perspective, necessitated expansion of the existing lead fines rougher circuit and construction of a new larger zinc cleaner circuit – which is where Outotec came in.

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## A challenging project

The challenge was to achieve a sustainable flotation plant capacity of 2.4Mtpa at not only minimum cost and within a limited timeframe, but also without disruption to existing operations. The area available for the flotation plant upgrade was also extremely limited, placing pressure on cell layout and project installation.

Given these challenging constraints, it was recognized early that a 'partnership' approach between Cannington, engineering company Fraser Osborn and Outotec would be the most efficient means of achieving this challenging project.

## Lead fines rougher expansion

Downstream of the existing roughers 1 and 2, the installation of a third 100m<sup>3</sup> TankCell® rougher would provide the required capacity for 2.4Mtpa. Ideally, to create enough driving head, the third rougher needed to be installed 800mm below the existing units. However, roughers 1 and 2 were installed only 300mm above the sump floor, and due to constraints such as space and the inability to interrupt plant operations, upstream installation or sump floor excavation were not possible.

"Further options, such as installing a smaller TankCell® would not have met volume objectives and pumping slurry between cells required additional footprint, and would increase operating cost. So we designed a non-standard cell which could fit into the limited area, yet handle the target volume objectives at the same time" explains Andrew Okely, Manager Minerals Processing Technologies at Outotec.

## New zinc cleaner circuit

Again, as with the lead fines rougher expansion, there were challenges involved in the zinc cleaner's design. The new zinc cleaner circuit consisted of 11 x 38m<sup>3</sup> conventional cells in a three-stage circuit. Typically, this cell configuration would be installed in a single line, with the tail from the upstream stage gravitating to the next downstream stage. A three-stage circuit such as this would typically require approximately 50m x 7m – however, the only available area for the new circuit was 14m x 25m.

The only option was to change the direction of the tailing flow after each cleaner stage. Although there can be some drawbacks to this approach, with careful design it was a viable option. The step height between cells was increased by 100mm, ensuring a sufficient compensation in drive head from that lost in the change of flow direction.

## Zinc cleaner circuit elevation

In order to minimize cost and ensure ease of operation, the circuit elevation was kept to a minimum. As concentrate pumps were connected directly to each bank's launder, cleaner bank 1 was installed at 1000mm, with 2 and 3 at 1600mm and 2200 respectively. This allowed the use of relatively light prefabricated support structures for all three banks – not only creating easy access for operators but also representing significant time and cost savings.

## Delivering the project

Once all the hurdles with design were overcome, delivery of the project was the next challenge. For installation, Outotec supplied the same technical advisor who had managed all the trial assemblies. The fabricator who had built the main plants' split flotation and flotation cells was also contracted.

"This continuity of personnel ensured complete familiarity with the technology and also familiarization with site layout and standards. The fabricator, for example, was able to use the same jigs from the original project. Also, as the personnel knew each item intimately, the correct components were used in the correct areas. Our approach ensured there was no time wasted looking for missing components, which can be a common issue on site" says Okely.

## Solution reduces projected budget by 10%

23 weeks after the project was approved, dry commissioning of the flotation upgrade cells was commenced. Just three weeks later, in mid-August 2003, the plant was cut-in. This entire programme was completed five weeks shorter than initially planned. From a cost perspective, the projected original budget was reduced by approximately 10%. Solutions such as supplying pre-fabricated supports, reducing engineering through co-operative design and removing of the concentrate and tailings sumps for the lead rougher and zinc cleaner circuits contributed considerably to cost savings. Not only that, but through early completion of the project, additional earlier earnings further enhanced the monetary benefits.

*Outotec is a worldwide technology leader providing innovative and environmentally sound solutions for a wide variety of customers in minerals and metals processing as well as related process industries. Outotec Oyj is listed on the NASDAQ OMX Helsinki.*

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