

TankCell® provides optimal recovery for Macraes

Author: Peter Bourke & Alan Berzins

The challenge:

Macraes gold was a two train plant. Each train consisted of an Outotec Flash Flotation Cell on the cyclone underflow which recovered 50-65% of the sulphide minerals. The cyclone overflow is then fed into rougher column cells with the tail from the columns passing into Outotec mechanical scavengers. Concentrate from the rougher and scavengers is reground and passed through a cleaner circuit, with the final concentrate being treated in a pressure oxidation circuit.

This circuit had four key challenges:

1. Restricted throughput due to a lack of flotation capacity
2. Difficult to operate with two flotation trains
3. Recovery was not optimal which was linked to the poor performance of the column cells
4. Expensive to operate and maintain

The solution:

The circuit capacity was to be expanded whilst at the same time returning to a single flotation train operation. Previous testwork had shown that a 2% increase in recovery of sulphides could be expected if the column flotation roughers were replaced with TankCells®. Thus a plan was undertaken in which the two flotation trains would be combined through the installation of a new rougher flotation stage which consisted of 3 x TC-300 cells, with each of these TankCells® having a volume of 300m³.



Macraes 3 x TankCell® - 300

The tails from these cells would be fed into the existing 2 x TC-150 scavengers. The existing rougher columns were to be decommissioned whilst the train 2 scavenger cells, 5 x OK38 were to become additional cleaner cells. The resulting circuit would have a 6mtpa capacity through a single flotation train.

The project also sought to incorporate the latest in control technology for the new TankCells®. Each TankCell® was fitted with the FrothMaster™ 2 froth imaging system and an overall control platform was supplied for management of air addition, froth speed and level in the new cells.

The implementation:

The circuit configuration was finalised in May 2007 and construction of the first TC-300 started immediately. This cell, being the first of its size, was subjected to rigorous testing in Perth WA before another 2 TC-300's were constructed in New Zealand. In June 2007 Outotec began work on site to prepare for installation of the TC-300 cells. Works included civil and earthworks, significant upgrades to the electrical system on site and a detailed plan for integrating the cells into the existing circuit, including design of all pumping, piping additional flotation air blowers and the rerouting of existing slurry piping. Upon arrival at site the new flotation cells were installed into the circuit and, after mechanical commissioning, were integrated into the circuit in November 2007 during a 48 hour shutdown. Within 1 hour of the plant restarting after the shutdown, full operation of the flotation circuit was achieved.



The outcome:

The introduction of the new TC-300 rougher cells achieved all of the project aims. The circuit is now operating on a single train basis with operator comments confirming the significant improvement in ease of operation. Throughput at the targeted 6mtpa has been demonstrated. Early plant metallurgical results indicate a 4% increase in sulphide recovery which is double the contracted objective. This result will be further evaluated through a complete plant survey program in the near future. The cost of operating the flotation circuit has decreased with the decommissioning of the old rougher columns.

The TC-300 cells are demonstrating great mechanical and metallurgical stability. The control system provides for a consistent and stable froth surface (despite the very low sulphide feed grades) which provides excellent metallurgical results. Concentrate grades have increased in the rougher circuit whilst simultaneously achieving higher recovery through the careful application of froth control.

The 3 x TC-300 were installed on an exceptionally small existing plant footprint. In this case, gravity flow of tails makes the operation particularly efficient. Outotecs' recent scale up of TankCell® sizes to 200m³ and now to 300m³ is an important highlight with flotation efficiencies being easily maintained in these larger cell sizes.



Installation on an exceptionally small existing plant footprint

The future:

Further analysis on the performance of the new TC-300 cells is planned including a full air distribution and bubble size survey, metallurgical surveys and ongoing analysis of operating costs. All of this information will be used for further development of both new TankCell® designs and improvements on existing TankCells®.

Peter Bourke is currently Outotec's Global Technology Manager - Flotation Process. He has over 16 years experience in the design and selection of minerals processing technology having worked on projects such as Leinster, Mt Keith, Kambalda, Century Zinc, Escondida, Chuquicamata, Cadia /Ridgeway, Telfer, Boddington, Mt Isa and Macraes TC300s. Peter had over 16 years production experience in the minerals processing industry before joining the company in 1991.

Alan Berzins is currently Project Manager - Minerals Processing for Outotec Pty Ltd in Australia. Alan is a Chartered Chemical Engineer, University of Sydney and is responsible for the Project Management of the Supply and Installation of Flotation Cells and Thickeners in Australia and offshore. Alan has had 25 years experience as an Engineering Project Manager for Minerals Processing, Water Treatment, Desalination, Nuclear and Pharmaceutical Industries.

If you would like more information, click here to contact

Peter.bourke@outotec.com

Alan.berzins@outotec.com