



# TURN-KEY FLOTATION RETROFIT WITH FAST TURNAROUND FOR YAMANA GOLD IN BRAZIL

**Outotec delivered an extremely fast turnaround, minimizing production losses and increasing recovery while improving the availability and energy efficiency of the flotation cells.**

Yamana Gold is a Canadian-based gold producer, with mines and operations in Canada, Mexico, Brazil, Argentina and Chile. The Chapada open pit gold-copper mine in Brazil began production in 2007. It is a relatively low-cost operation and contributes significantly to Yamana's favourable cost structure.

Last year, Outotec delivered a new Courier on-stream analyzer, which enabled Yamana operators to detect

## CHALLENGES

- Poor flotation performance in terms of copper and gold recovery
- Flotation circuit had poor availability due to heavy sanding
- Substantial maintenance requirements due to heavy corrosion
- Limited time available for shutdown

## SOLUTION

- In-depth metallurgical assessment identified large improvement potential in the flotation plant
- Retrofit of 2 lines of 5 existing 160m<sup>3</sup> flotation cells with 2 lines of 5 x TankCell160
- A full turn-key delivery, including shutdown planning, scheduling and management and manufacturing steel works and tanks in Outotec Brazil own service center
- Advanced operator training with Outotec's Virtual Experience training

## BENEFITS

- Greater stability and control of flotation cells allowing for increased process optimization
- Significantly decreased energy consumption with Outotec cells (40%)
- Minimized production losses during installation and commissioning, second bank shutdown took only 6 days instead of planned 11
- Minimized sanding increases flotation circuit availability, leading to increase production
- Improved flotation performance, recovery of both copper and gold



Outotec engineers providing training on Outotec Courier 6 On-Stream XRF Analyzer.

that they were losing a significant amount of valuables to tailings. In addition, the flotation circuit suffered from poor availability that was caused by heavy sanding of the other supplier's flotation cells. Yamana was also looking for a partner to continuously improve their operations. These factors contributed to Yamana seeking ways to further improve its flotation circuit performance.

In mid 2015 Daniel Diez, responsible of Yamana Gold business and operations development in South Americas, and the entire site processing team were seeking ways to further improve the flotation circuit performance at their Chapada gold-copper mine in Brazil.

After a thorough research of available technological options, including the FloatForce value calculator at [www.outotec.com](http://www.outotec.com) to estimate the potential return of investment (ROI) of a flotation retrofit project, Outotec's experts were contacted to jointly develop a solution to solve Yamana's operation challenges in Chapada flotation circuit.

In March 2016, Outotec began turn-key retrofit of 10 existing 160m<sup>3</sup> non-Outotec flotation cells with Outotec TankCell<sup>®</sup> and FloatForce<sup>®</sup> technology.

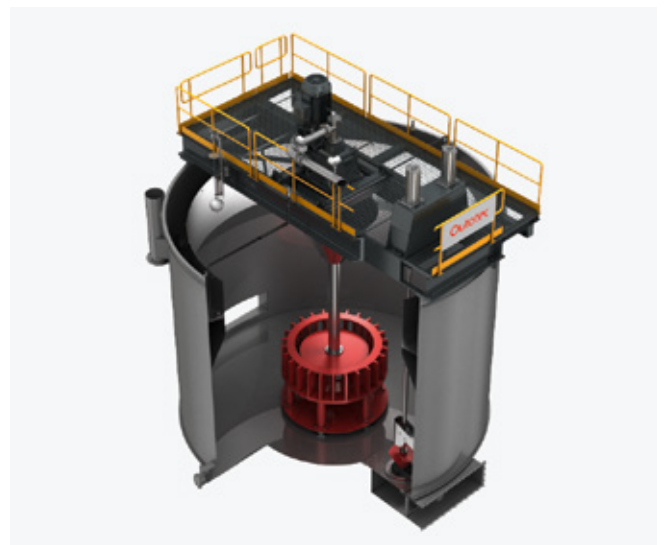
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**Yamana was also looking for a partner to continuously improve their operations.**

### Project Scope

The project scope included Computational Fluid Dynamics (CFD) studies, basic and detailed engineering, shutdown planning, delivery of proprietary equipment, turn-key installation, commissioning, assisted operation and advanced training of on-site personnel. Outotec's manufacturing and service workshop in Guarapari, Brazil, gave additional benefits and flexibility to this project.

At the beginning of the project Outotec completed an in-depth metallurgical assessment of the rougher/scavenger flotation circuit and identified a large potential for improvement in the flotation plant, which could positively impact the overall copper and gold recoveries. An on-site mechanical assessment with advanced



Delivery scope contained standard Outotec TankCell<sup>®</sup> e160 components modified to fit the tanks.

laser 3D scanning was implemented by Outotec in co-operation with Yamana to find out all required technical details for the installation and shutdown planning.

Outotec offered a turn-key project delivery, manufacturing custom made steel works in Brazil and importing only specialist items, took care of logistics, disassembly and removal of old equipment, installation and mechanical completion of new cells, implemented all commissioning phases, started up the flotation cells in cooperation with Yamana personnel with slurry. Process testing was done in cooperation with Yamana process experts. All installation and commissioning personnel were provided by Outotec (except for certain electrical specialists which were contracted locally). In total, more than 80 Outotec representatives implemented the modernization in day and night shifts.

In addition to retrofit and turn-key delivery, advanced operator training with Outotec's Virtual Experience training, was provided by Outotec.

### Fast and efficient shutdown

The shutdown took place in two phases, one line of five flotation cells at a time. This meant that the process was able to continue with half the equipment operational at all times.

"As the reduction of production loss due to the installation work was of utmost importance to the customer, Outotec developed a concept with the target to minimize the shutdown period, which takes the total cost of the project and the return of investment into consideration. With this concept and the full solution including demolition, installation and commissioning and shutdown process know-how, Outotec offered the added value to the customer and won the project," said André Batista, Sales Director, Outotec Brazil.



Outotec personnel providing flotation Virtual Experience Training for Yamana Gold in Brazil.

Cooperation continues by debottlenecking other parts of the process to ensure peak performance of the whole plant.

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Yamana Gold Chapada mine site in Brazil.

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Outotec provides leading technologies and services for the sustainable use of Earth's natural resources. As the global leader in minerals and metals processing technology, we have developed many breakthrough technologies over the decades for our customers in metals and mining industry. We also provide innovative solutions for industrial water treatment, the utilization of alternative energy sources and the chemical industry. Outotec shares are listed on NASDAQ OMX Helsinki. [www.outotec.com](http://www.outotec.com)

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