First Years of Operation of the Rio Tinto AP 60 OZEOS Gas Treatment Centre: Solid Results and Promising Future

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Abstract

The gas treatment centre of Rio Tinto AP 60 potline, treating gases from 38 pots, has reached its full operation at the end of 2013. It features the most advanced scrubbing technology designed by Fives, OZEOS, built with state-of-the-art fresh alumina distribution system, scrubbing modules with integrated reactors and a capability to operate in Cascade feed mode when required (ex. high gas temperature). These basic elements are combined with low energy consumption fans and extended surface bags on one filtration unit (out of five) to achieve the best scrubbing efficiency and lowest emissions possible. This paper summarizes the first years of operation, presents benchmark emission results and demonstrates the specific features that will improve the performance of this technology in the future.

Keywords: Gas treatment centre (GTC); aluminum electrolysis pot emissions; HF scrubbing; Cascade feed.

1 Introduction

In 2013, RTA and Fives specialist teamed up to start up and bring to normal operation a new scrubber technology. The cooperation of both teams during the start-up and operation was an important contribution in the achievement of these state of the art performance results.

This new generation of GTC process filter modules has been developed by Fives over the last decade. It is called OZEOS and has been tested since 2005 in RTA's LRF Research center in Saint-Jean-de-Maurienne, France. In 2010, the OZEOS technology was selected by Rio Tinto Aluminium to treat the gas of its new AP 60 potline at their Jonquiere site in Quebec (Figure 1). It features a more compact design that best suits the large gas volume treated by centralized GTCs for modern high amperage pots and includes a lower velocity reactor that reduces the risks of scaling, abrasion and alumina attrition. It is provided with bag length up to 8 m and can be equipped with conventional or with extended surface type filter bags, both using micro-denier polyester for best particulate filtration.

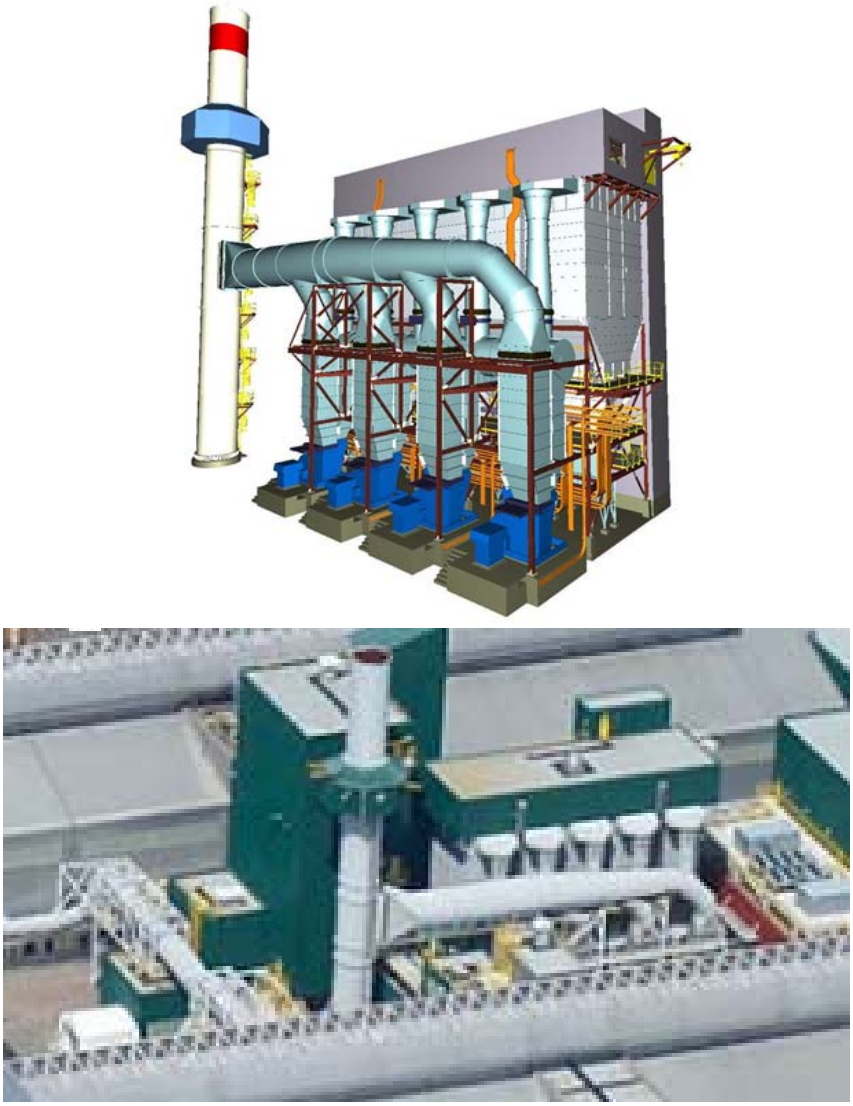

Figure 1. OZEOS - the state-of-the art scrubbing technology for modern smelters.

This advanced dry scrubbing system also includes a series of features to facilitate control, maintenance and to improve fluoride scrubbing. These features are:

- Bag leak detection at each filter module with automatic detection of the leaking row.
- Readiness for continuous monitoring of gaseous fluoride (HF) at each module outlet which allow improved tracking of the GTC performance and to help trouble shooting.
- Control of the gas volume treated by each module through continuous gas flow measurement combined with a modulating filter outlet damper. This is particularly useful when the plant start changing bags one module at a time as new bags offer lesser resistance to flow.
- Finally, best in class fresh alumina distribution system with a unique offering of three modes of operation aimed at providing the lowest GTC fluoride emission:

- The classic mode using a distribution box with calibration system and individual air conveyors that ensures an equal distribution of fresh alumina to each reactor/scrubber module (Figure 2).

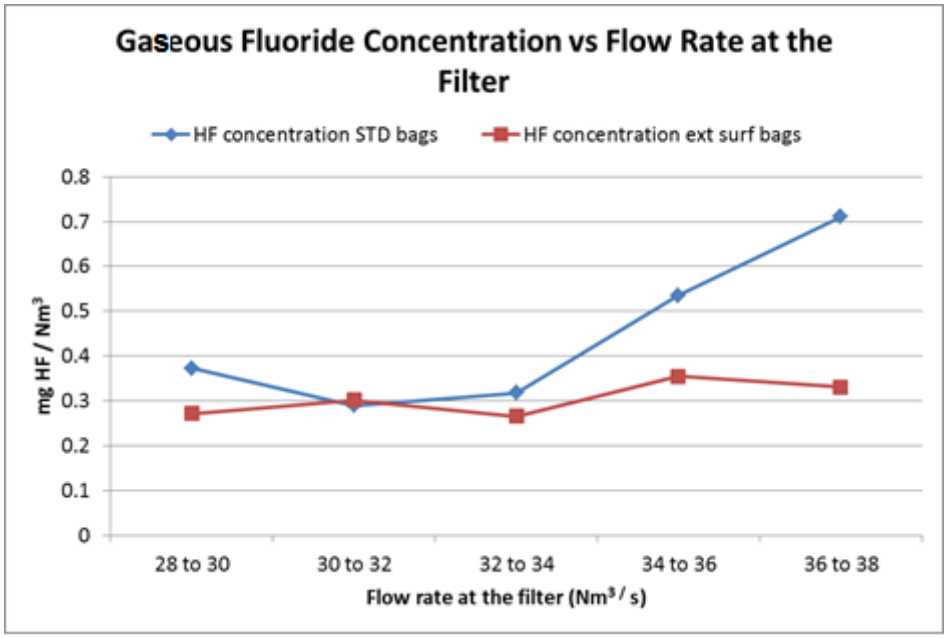

Figure 7. HF concentration at different interval of filter flow rate comparing standard bags with extended surface bags, during different period in 2014 and 2015.

2.6 GTC maintenance and improvements

The overall maintenance requirements of the GTC have been low. In the first 30 months, only a few bags (less than 10 out of a total of 4 000) have been changed. The module fluidized hoppers have not required any cleaning yet which indicates a low scale formation. The more important maintenance issue has been the replacement of some of the piston pulse valves that had a tendency to jam. After a thorough investigation of the possible causes, a solution was found with the replacement of the compressed air inlet filter upstream each pressure regulator. The selection of filters with smaller mesh openings (20 micrometers instead of 40 micrometers) has resolved this problem.

Another part of the equipment that needs to be serviced twice a year is the U shape horizontal air conveyor that feeds fresh and recycled alumina into the reactor. This is a zone where small scales and other impurities accumulate (depending on the performance of the fresh alumina vibrating screen). Vacuuming this air conveyor twice a year is needed to ensure good fluidisation and optimal alumina feed to the reactor.

3 Conclusion

The OZEOS dry scrubber has proven to be a very robust and efficient technology to treat the gas from ultra-high amperage pots. The Jonquière installation includes state-of-the-art instrumentation and control that help the operation personnel in ensuring the GTC maintains optimum performance. The Cascade feed technology has demonstrated its benefit in lowering fluoride gas emission during the summer season. The OZEOS scrubber design, with low velocity reactor, new alumina injection system, fan selection and potential retrofit with extended surface bags, has all the features to maintain excellent emission performances in the future.

4 Reference

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