AL01 - The Successful Implementation of EGA DX+ Ultra Technology at ALBA

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Abstract

Emirates Global Aluminium (EGA) launched the design and engineering phase of DX+ Ultra technology in 2013 in order to further lower CAPEX and cell energy consumption of the successful high productivity DX+ technology operating in EGA's Al Taweelah Potline 3. It was followed by the commissioning of five demonstration pots in 2014 in the Eagle section at EGA's Jebel Ali smelter. In February 2016 Aluminium Bahrain (ALBA) signed a Technology Licence Agreement with EGA for a single potline with 424 cells. Following Front End Engineering Design (FEED), construction of the potline started in August 2017 and it took only 23 months to reach Last Hot Metal, i.e., the startup of the last cell. The 424 DX+ Ultra technology cells of ALBA Potline 6 were all started between 9th December 2018 and 31st July 2019, making ALBA the world largest single-site aluminium smelter outside of China. As stipulated in the Technology Licence Agreement, a Performance Test of the DX+ Ultra technology was carried out on a group of 30 adjacent cells over a period of two months in October and November of 2019. The key performance indicators achieved by the performance test cells and by the rest of the potline exceeded the guaranteed performance criteria. This was achieved through excellent teamwork and continuous coordination between ALBA's operations and process team with EGA's support team on site. In this paper, detailed analysis of the results of DX+ Ultra technology operation at 465 kA and a description of the Technology Performance Test are given.

Keywords: ALBA potline 6, DX+ ultra technology, performance test, high amperage - low energy consumption cells.

1. Introduction

EGA has developed the proprietary DX+ Ultra technology and proved its performance in five DX+ Ultra demonstration cells in the Eagle section of EGA's smelter at Jebel Ali from 2014 onwards [1]. DX+ Ultra is EGA's high productivity, low energy cell technology, which evolved from DX+ technology first installed in 5 demonstration cells in EGA Jebel Ali in 2010 and in 2013 in EGA's Al Taweelah Potline 3 [2]. The DX+ and DX+ Ultra potshell and superstructure are the same and the main design change is the shorter centerline distance between two adjacent pots reduced from 6.3 to 6.0 m, leading to reduced CAPEX per tonne of installed capacity. This

was made possible by a modification of the pot-to-pot busbars including split anode risers, leading to reduced external voltage drop. The other improvements included collector bars with copper inserts and longer anodes, all combined leading to reduced cathode, anode and bath voltage drops. All the design changes lead to a reduced specific energy consumption ranging from 12.5 to 13.0 kWh/kg Al (depending on the operating amperage). The DX+ Ultra demonstration cells started with an initial amperage of 450 kA and after that, step-by-step, the cell amperage was increased to 480 kA.

ALBA selected DX+ Ultra technology for its Potline 6 Expansion Project (Figure 1) to take advantage of the shorter pot-to-pot distance, which allowed increasing the number of cells from 404 DX+ cells to 424 DX+ Ultra cells in the same potroom buildings (Figure 2). Due to some limitations in site area the distance between the two potrooms ended up being lower than initially proposed and additional magnetic field compensation using asymmetric busbars was required [1]. It was decided that this solution would be proven in EGA Jebel Ali DX+ Ultra demonstration section, where two cells were stopped and replaced by industrial design cells with ALBA asymmetric busbar design and somewhat modified potlining.

All 424 DX+ Ultra pots of ALBA Potline 6 were started between 9 December 2018 and 31 July 2019 [3]. A Performance Test Protocol was prepared to define the detailed organization and unwinding of the Performance Test of the DX+ Ultra reduction technology, which was carried out in a single section with a group of 30 adjacent reduction pots E110 to E139 over a period of sixty days from 1st October 2019 to 30th November 2019.

In this paper, a detailed analysis of the results of DX+ Ultra cell operation at 465 kA and a description of the Technology Performance Test are given. Contractual and non-contractual data were monitored and are reported here as well.

Figure 1. Aerial view of ALBA smelter with Line 6 in the center.

2. Milestones in the Development of DX+ Ultra Technology

2.1. DX+ Ultra Eagle demonstration cells

The goal of designing and building DX+ Ultra demonstration cells was to test for a future expansion or Greenfield smelter with lower CAPEX, higher productivity and lower energy consumption cell than with using DX+ cells. The cells were started up between January and May

5. Conclusions

EGA's DX+ Ultra Technology has progressed from the conception and modeling phases through to industrial implementation in a very short period. In ALBA's Potline 6 the Performance Test confirmed that the DX+ Ultra pot performance exceeded by a large margin the Performance Criteria set in the Technology Licence Agreement and is of world class for high amperage cells. As presented, other performance parameters that were not specified in the Licence Agreement but of keen interest, were also excellent. Development work is ongoing and DX+ Ultra pilot cells in EGA Jebel Ali Eagle section are currently operating at 480 kA, providing advanced knowledge on the operating parameters before applying it to a full potline.

6. References

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