XINFA Twin 60 tph Rhodax Green Anode Plant - 5 Years Later

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Abstract

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In 2018–19, Xinfa and Fives were commissioning the twin 60 tph Green Anode Plants (GAP) based on the Rhodax process. It was a premiere for such western breakthrough technology in China. These twin GAPs were part of an ambitious brand-new integrated carbon plant from petroleum coke calcination to production of the prebaked anodes feeding 600 kA SAMI technology pot lines.

The start-up and performance of these GAP were presented at ICSOBA in 2021. Xinfa has been operating these plants successfully for more than five years. This paper summarizes the evolution of the performance of this installation, the challenges encountered, and the modifications implemented by Xinfa to maintain the Overall Equipment Effectiveness (OEE) at peak performance and the initial high environmental standards.

Keywords: Anode, Rhodax, Xinfa, Fives, Green anode plant

1. Introduction

1.1 Xinfa

Founded in 1972, Xinfa group is a modern large-scale enterprise integrating power generation, heat supply, alumina, primary aluminum and aluminum downstream processing industries. Since 2022, Xinfa has also been massively and successfully investing in modern industrial agriculture projects.

Xinfa has an electrolytic aluminum production capacity of more than 4 million tonnes per year based on Chinese high amperage pot technology. This production is distributed over four main sites in the Chinese provinces of Shandong and Xinjiang.

The green anode plant project described in this paper is part of the Aluminum Smelter complex of Chiping city based in Shandong province.

1.2 Fives

With more than 200 years of industrial history, more than 9 000 employees and 100 subsidiaries worldwide, Fives designs and supplies machines, process equipment and production lines for the world's biggest industrial players, in aerospace, automotive and manufacturing industries, cement, energy, logistics, steel, glass and notably in the aluminum sectors.

In the aluminum sector, Fives covers several fields of expertise:

- Carbon with the turnkey supply of green anode plants, crushing recycling units, firing control systems, fume treatment centers, furnace tending assemblies, anode rodding shops, among others equipment and facilities.
- Reduction with gas treatment centers including heat exchangers, pot tending machines, cathode transport cranes, anode changing cranes or beam raising frames, various pot equipment, pot feed and alumina transport systems or Bath treatment plants.

With more than 50 references, the carbon sector flagship is the green anode plant (GAP). It is typically proposed either as turnkey or technology package. For the past 25 years, Fives green anode plant technology has been based on the RHODAX® process.

2. Xinfa Aluminium Smelter in Chipping

The twin 60 tph green anode plants were part of a carbon plant project started in 2015. This integrated carbon plant shown in Figure 1 comprises a green coke storage area, shaft calciners, calcined petroleum coke (CPC), pitch and recycled materials storages, two green anode plants, two rodding shops, one green and baked anode storage area, two baking furnaces and one fume treatment center including SO_2 scrubbers.

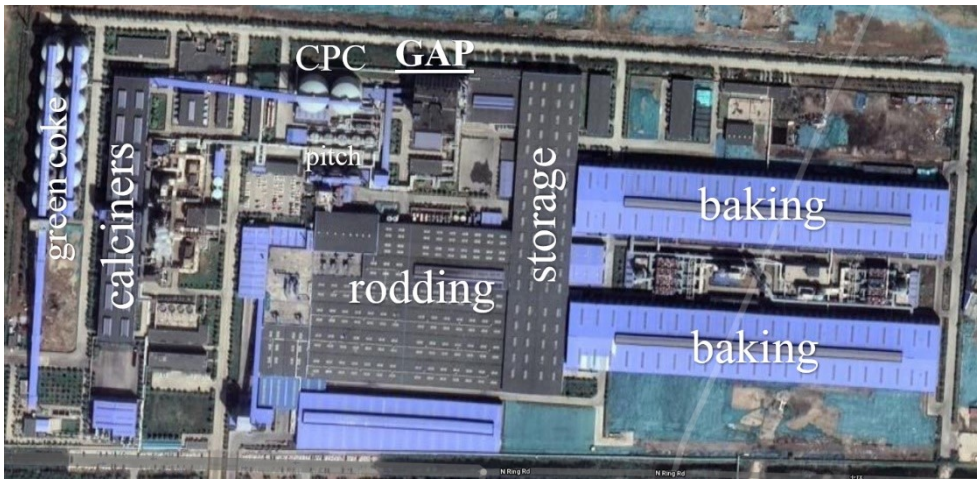

Figure 1. Xinfa, Chipping, new carbon plant (Google maps, satellite view, image ©2021).

This carbon plant can produce 800 kt of baked anodes per year, feeding some of the older existing pot lines and the new SAMI SY600 pot lines commissioned in 2016 with an actual production capacity of more than one million tonnes of aluminum per year.

Fives and Xinfa commissioned these green anode plants in 2018–2019 and the detailed description of this project as well as the first 2 years of operation results were presented at ICSOBA in 2021 [1]. Some key elements are recalled hereafter along with the evolution of the performance of this installation, the challenges encountered, and the modifications implemented by Xinfa to maintain the OEE at peak performance and the initial high environmental standards.

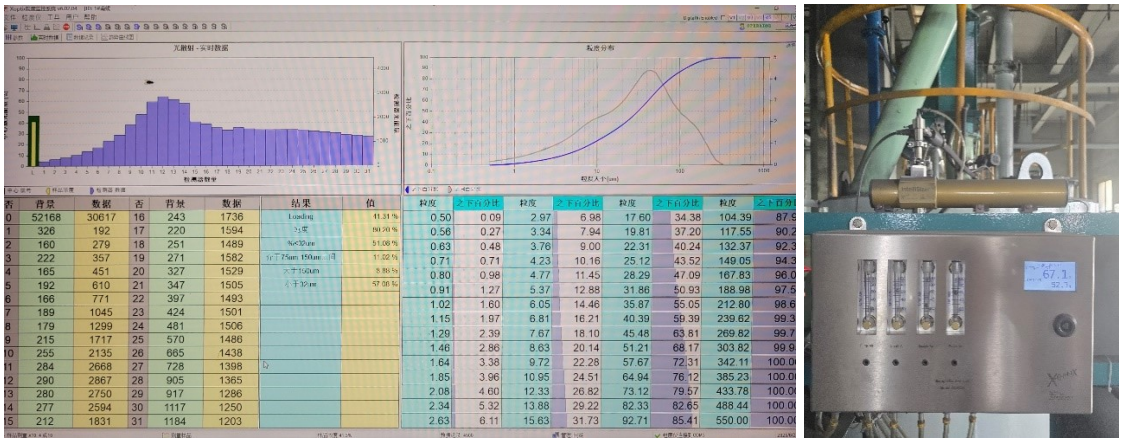

Figure 16. On-line size analyser. Left: HMI, Right: Field device.

6. Conclusions

Rhodax "S" process-based technology for green anode plants at Xinfa's Chiping aluminum smelter was a premiere for such technology in China. After more than 5 years of operation and a long period with limited access to the plant due to COVID time, Fives and Xinfa jointly reviewed the actual and historical status & performance of the plant. Both appeared to stay at a high level in terms of production, anode quality and environmental control. Few challenges were successfully addressed by Xinfa alone, demonstrating a good ownership and high level of mastery of the technology. Few more, like reducing ER and increasing GSR are currently addressed and the results the on-going optimization work will be published at a later stage.

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