

## The First Rhodax Green Anode Plant in China

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### Abstract



In 2016, Xinfa awarded Fives a technology package comprising two-twin 60 tonne per hour 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 latest version of this GAP technology has successfully been commissioned to produce anodes at the highest ever production rate, for high amperage pot technology. More than 20 years of capitalized experience combined with the evolution of the technologies, has allowed Fives to meet Xinfa's challenges:

- Higher environmental requirements with limited Volatile Organic Compound (VOC) and Polycyclic Aromatic Hydrocarbons (PAH) emissions
- Higher green anode plant Overall Equipment effectiveness (OEE) and stable anode quality

This paper will summarize the key project characteristics, challenges and lessons learnt as well as the performance achieved.

**Keywords:** Anode, Rhodax, Xinfa, Fives.

### 1. Introduction

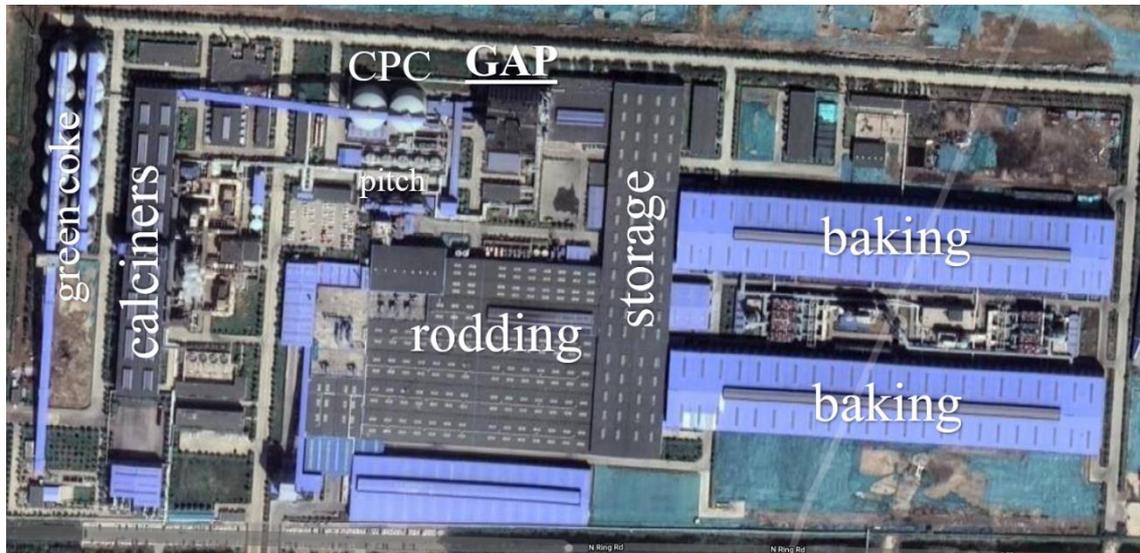
Founded in 1972, Xinfa group is a modern large-scale enterprise integrating power generation, heat supply, alumina, primary aluminum and aluminum downstream processing industries.

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 Chipping city based in Shandong province.

## 2. Xinha Aluminum Smelter in Chipping

The green anode plant is part of a new carbon plant project started in 2015. This new 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 (GAP), two rodding shops, one green and baked anode storage area, two baking furnaces and one fume treatment center including SO<sub>2</sub> scrubbers.



**Figure 1. Xinha, Chipping, New Carbon Plant**  
(Google maps, satellite view, image ©2021 CNES Airbus).

This carbon plant can produce 800,000 tonnes 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 tons of Aluminum per year.

Xinha wished to build a state-of-the-art carbon plant and selected the well-proven Rhodax based green anode plant technology [1], which was a premiere in China. In 2016, Fives Solios have then been awarded a technology package contract for two twin GAPs of 60 tph each. The contract included process definition, basic engineering, supervision, control system and integration of equipment bought out by Xinha directly such as paste mixer and paste cooler. Fives Solios also supplied key proprietary pieces of equipment such as Rhodax crusher, fine grinding production unit, vibro-compactor, key process bag filters and the EOLIOS [2,3] pitch fume treatment system and cooperated with SAMI in charge of the detailed engineering.

## 3. RHODAX® Technology at a Glance

The Rhodax process is the result of two parallel developments started in early 90's. In early 2000's, Fives and Aluminum Pechiney (AP now Rio Tinto) joined their R&D efforts and co-patented the SCAP-RHODAX process (Figure 2) which consists mainly in:

- Mixing all solids (raw coke, green and baked scraps) to crush them all together at the same time without any detrimental impact on anode quality
- Producing a recipe based on two size fractions only leading to a drastic flow sheet simplification

This reference was also the opportunity to enhance this technology with an improved version featured with innovations like the Rhodax 4D crusher, the Rhodax S process, the XELIOS 2.0 and new RV33 Eirich machine.

More than ever, carbon footprint as well as environmental impacts have become essential for modern aluminum smelters. In order to achieve that goal, it is necessary to maximize existing plant capacity utilization with high level of anode quality while limiting both plant emissions and rejects. This paper shows that Rhodax process technology, with repeated projects and continuous improvement achieved good performance aligned with these goals.

## 10. References

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