# CBA Green Søderberg Technology

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**Abstract**

Due to the world environmental challengers to decrease the carbon footprint and increase sustainability of the operations combined with increased productivity, CBA is upgrading the smelter technology to so called Green Søderberg (GS). This improvement proposes a change in the way of feeding alumina into the pots, shifting from side break to point feeding. This change in technology enhances current efficiency and furthermore decreases the emissions of greenhouse gases (from anode effects), particulate and fluoride emissions. CBA started this project in 2019, with a test on 36 pots to study and prove the gains. A multidisciplinary team worked in the mechanical, electrical and process control areas. The outstanding results of the test group such as a decrease of 70 % of anode effect frequency and more than 1 % current efficiency increase made possible the expansion of the project. The forecast is that in 2021 another 36 pots will be converted. It is noteworthy that during the conversion/start-up of the first 36 pots, it was found out that the future conversion of the pots can be made without shutting down the potline. This decreases the disturbance during the conversion and improves the speed of conversion. Furthermore, the production loss will be minimized because of this new procedure. When all pots have been converted (more than 1200 pots) to the new system, the wet scrubber systems will be replaced by a dry scrubber, eliminating the need for water in the process and secondary by products.

**Keywords:** Green Soderberg technology, Carbon footprint, Point feeder, Anode effect frequency.

## 1. Introduction

Companhia Brasileira de Alumínio (CBA) is located in Alumínio near São Paulo since 1955, being a fully integrated and sustainable aluminum producer. It has an installed capacity to produce 100 % of energy coming from its own hydroelectric plants, CBA mines bauxite, transforms it into primary aluminum (ingots, slabs, billets and others) and transformed products (caster rolls, sheets, sheets, extruded profiles) [1].

The current aluminum production use vertical stud Søderberg (VSS) technology pots with side breakage and over the years it has undergone some expansion and modernization processes. These processes included the implementation of wet HF scrubbing system combined with the gas

entrapment of 5 potrooms structures between 2002 and 2011. The environmental license for the other two potroom allowed to operate without the wet HF scrubbing system until 2019.

Seeking to meet environmental requirements, reducing emissions and improving the working conditions of employees, after analyzing some options, it was decided to implement a point feeder system [2, 3] due to its low investment, better working environment, non-use of water, improved pot current efficiency and productivity. The first Soderberg with point feeders was installed in 2018.

## 2. Green Søderberg Project

Currently, CBA operates, in the municipality of Alumínio (SP), with 6 potrooms with Vertical Soderberg Stud (VSS) technology, whose feeding process for these tanks is carried out by lateral breakage, at intervals pre-defined throughout the day, using break equipment. During this operation, a large amount of oxide enters the pot, increasing the percentage of alumina in the bath to values close to 5.5 %. In addition to the impact on the stability of the pot, at the time of this activity there is a considerable particulate emission.

The Green Soderberg project, started in 2017, aims to automate the pot feeding process, thus reducing emissions from this process and promoting additional gains in efficiency and productivity. This feeding system was initially installed in 12 pilot pots, in potroom 3. This change in equipment allowed these pots to be fed by aluminum oxide and aluminum fluoride on a timely basis [1]. To make this improvement possible, bins were installed in the pot and a structure of cylinders breakers. Figure 1 depicts a schematic drawing of the feeding system in a single pot and where it will be assembled.

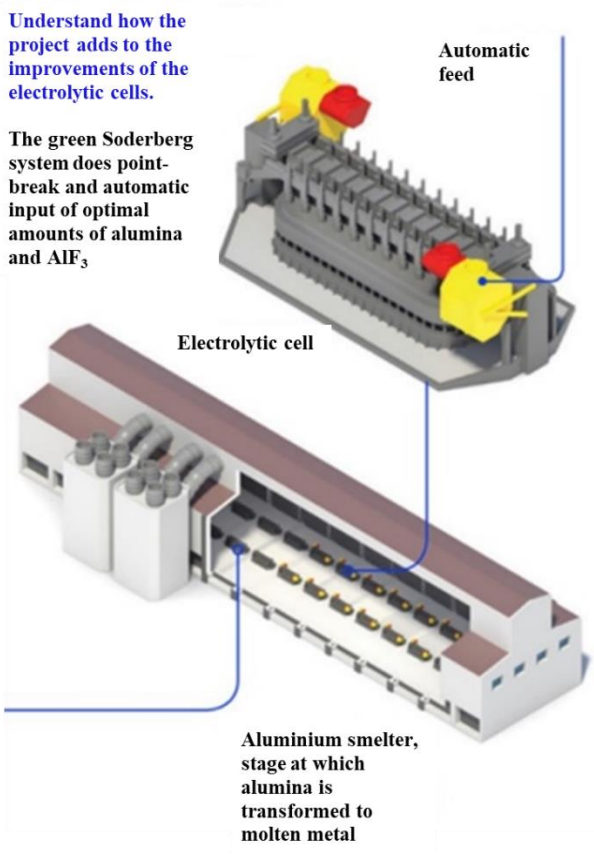


**Figure 1. Schematic drawing of the point feeder pots.**

## 4. Conclusions

The Green Søderberg project will not only meet all the Brazilian environmental requirements by reducing PFCs and HF emissions, but also improve the working conditions of employees in the potrooms. Furthermore, there are improvements of current and energy efficiency. The sooner CBA replaces the side break technology for point feeder technology the more benefits will be for the surrounding community will be achieved.

The point feeders were already proven technology in the prebaked anodes and is becoming a new reality for Søderberg pots. This change in technology will decrease the $CO_2$ footprint by more than 50 % from the current values.

## 5. References

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