

## Anode Baking Furnace at Aluminium of Greece goes Smart and Green with a new FTC and FCS

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### Abstract



Since 2017, Aluminium of Greece (AoG) has been modernizing its anode baking furnace (ABF) in order to minimize its environmental footprint. After a successful rebuild of the central casing of the ABF, AoG decided in 2019 to pursue the modernization with two major projects:

- Installation of a new fume treatment center (FTC) to cope with more stringent European emission regulation (BREF 2016),
- Installation of a new firing control system (FCS) to switch from heavy fuel oil (HFO) to natural gas (NG) in order to reduce CO<sub>2</sub> emissions.

FIVES technologies were selected for these two projects. The latest dry scrubbing filtration technology based on OZEOS filter modules and a new fumes cooling design were used for the FTC. The new FCS is equipped with the proven Low NO<sub>x</sub> injectors and a reduced number of ramps. FIVES technology packages included basic/detailed engineering and equipment supply. For the FTC, AoG was in charge of steel work fabrication and complete erection. For the FCS, AoG was responsible for all the modifications required in the brickwork of the ABF. Eventually, AoG commissioned both packages under FIVES supervision. Having both FCS and FTC on the same time and place, it was an opportunity for FIVES to implement some smart technologies like FCS-FTC synergy control philosophy and other digital tools like the ABF flue wall monitoring module. Despite COVID and as a consequence, reduced on-site supervision from FIVES, AoG and FIVES managed to successfully complete the project and achieve the required performances. This paper will summarize the key project characteristics, challenges and lessons learnt as well as the performance achieved.

**Keywords:** Anode baking furnace, FCS, FTC, OZEOS, Smart, Green, Fives, Mytilineos.

### 1. Introduction

MYTILINEOS is a leading global industrial and energy company with a strong presence in all five continents. The company operates four Business Units (BU), the Power & Gas BU, the Metallurgy BU, the Renewables & Storage Development BU and the Sustainable Engineering Solutions BU.

The Metallurgy BU of Mytilineos consists mainly of:

1. Aluminium of Greece, which is the largest vertically integrated alumina and aluminium producer in the European Union.
2. Delphi-Distomon, which is the second largest producer of bauxite in Greece and consequently in Europe, with an annual production up to 630 000 tonnes of bauxite, from underground construction sites only.
3. The subsidiary EPAL.ME, which is the largest independent producer of recycled aluminum, contributing to the company's focus on sustainability.

Aluminium of Greece was established in the 60s, and back then was part of the Pechiney Group.

Aluminium of Greece produces 900 000 tonnes of alumina and 190 000 tonnes of aluminum. The smelter division of the plant consists of the Potlines, Carbon Plant and Rodding Shop, Casthouse and Substation.

Since 2017, Aluminium of Greece (AoG) has been modernizing its anode baking furnace (ABF) in order to minimize its environmental footprint. After a successful rebuild of the central casing of the ABF, AoG decided in 2019 to pursue the modernization with two major projects:

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This paper deals with the details of these two projects from both a technology and an implementation point of view.

## **2. Firing Control System**

The main reasons for converting the existing Heavy Fuel Oil (HFO) Firing Control System (FCS) to Natural Gas (NG) are:

- The technology of the old burning system is outdated.
- The environmental footprint is dramatically improved with the installation of natural gas.
- The significant ergonomic improvement of the new FCS.

AoG's Anode Baking Furnace (ABF) runs in a 26 h cycle and has 78 sections, 7 flue walls and 6 pits per section. The current flue wall's peephole dimensions were too small to fit the new FCS injectors. Moreover, as it is an old Pechiney design, the head walls have an opening on their top, in which the Exhaust Ramp (ER), Blowing Ramp (BR) and Cooling Ramp (CR) fit (Figure 3). So, prior to the installation of the new FCS, a lot of modifications needed to be done, as far as the brickwork is concerned, taking under consideration that:

- All modifications should be done during production and
- Cost of modifications should be kept as low as possible.

### **a. 1st Phase**

In the first phase, which started at 05/01/2021 and ended at 20/02/2021, two (Figure 1, A & C) out of the total four flue wall top blocks were changed, with a new larger peephole. This was because Heavy Fuel Oil (HFO) injectors operate in counter flow (Figure 1, B & D), so changing the top blocks A & C will not affect the HFO injectors operation.

## 5. Conclusion

Regarding the new FCS, there is not much to say about its performance as AoG has moved back to HFO, given the current situation of natural gas market. Due to that, the performance tests of the new FCS are still pending.

Now as far as the FTC is concerned, its operation from day one up to now, is quite smooth and has improved dramatically the environmental footprint of the ABF.

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