Major reconstruction of central casing of open top baking furnace with a view to increase its lifespan and reduce the total costs comparing to full reconstruction

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Abstract

Anode baking furnace (ABF) is fundamental for the production of anodes with specifications and quality suitable for aluminum electrolysis. The anode baking furnace shell inside whom the refractory is installed is usually called "casing" or "tub" and is made out of various concrete elements. The casing is a critical component of the facility and usually faces very few modifications during its lifetime due to the magnitude and complexity of the work and therefore its impact on production capacity. Aluminium of Greece (AoG) operates with success its anode baking furnace since its start up, more than five decades ago. Thermal and mechanical stresses created by the baking process however affected the integrity of the concrete casing in the central part. Distortions, deformations and cracks were indeed visible in comparison to the outside part of the casing. This paper goes through the different phases undertaken by Aluminium of Greece in order to successfully develop and safely realize a major repair on its casing while limiting costs and impacts on production and anode inventory. The scope of work was indeed composed of the replacement of the casing walls in the central passage as well as the anode conveyor supporting structure with a limited impact on the refractory (insulation, headwalls and fluewalls). The article details the technical challenges and innovative solutions as well as the project and operation organization put in place in order to realize the work without any safety incident and in a strict schedule of ninety days. Finally, the start-up and ramp-up phases realized by Aluminium of Greece operation team in order to successfully manage old and new sections and bring back the furnace at steady production in a minimum time are detailed.

Keywords: anode baking furnace revamping, concrete casing, casing walls, headwalls, fluewalls.

1. Introduction

Anode Baking Furnaces (ABF) are fundamental for giving the anode its most significant properties, such as electrical and thermal conductivity, air and CO_2 reactivity, mechanical strength etc. To do so, green anodes are fed into pits and heated up to 1150°C. The main parts of the Baking Furnace consist of the concrete casing (composed of the casing walls and raft) and the refractory bricks for the thermal insulation and the headwalls and fluewalls.