

Carbon Anode Laboratory

Introduction

In the production of aluminium, the properties of the carbon anodes are important for the overall process stability. If you want to study carbon anode properties at low costs, our Carbon Anode Laboratory may be the answer. The Carbon Anode Laboratory is developed over the years through close cooperation with several aluminium companies. Today we have a well equipped laboratory, making us able to study practical, as well as fundamental, problems related to composite carbon materials.



Flexibility

The anode laboratory is highly flexible and may easily be modified to explore new challenges. As an example, the vibration compactor is equipped with load cells and strain gauges for measuring the dynamics of compaction. This gives us the ability to study the density development as a function of time at different temperatures, with different tar levels, different raw materials and aggregate sizes. A data acquisition system gives in situ information on the dynamics during the green mass transformation from plastic through elastoplastic to elastic behaviour. An EIRICH Intensive Mixer is used for mixing paste, although, our old sigma blade mixer may also be used on request.

Examples

The Carbon Anode Laboratory have been used to study the influence of different parameters on the behaviour of prebaked anodes in the aluminium electrolysis.

Typical examples of our work are:

- optimisation of pitch level
- optimization of aggregate composition
- influence of different additives on CO₂- and air-reactivity
- effect of green properties on the baking performance

Ferro Alloys

The Carbon Anode Laboratory may also be used to study carbon materials used in electrodes and linings in the production of ferro alloys.

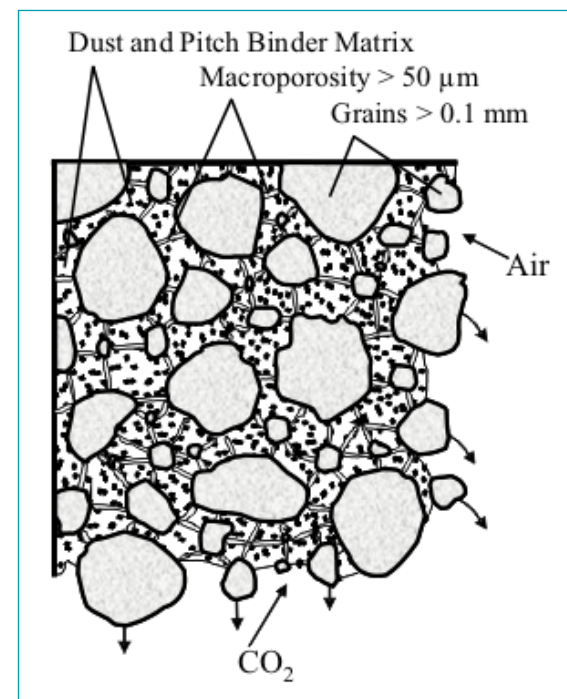


Illustration of selective burning of carbon anode

A Step by Step Description

Raw Materials

Raw materials are typically petrol coke and coal pitch tar, but ramming paste or green paste for electrode manufacturing may also be used. We also test industrial green pastes for individual differences.

Crushing and Sieving

Crushing and milling of any coke raw material are feasible. The aggregate is first crushed in a jaw crusher. For small samples, finer fractions may be produced in a swing mill. For larger samples, an air swept ball mill circuit is used. The crushed materials are screened to defined size fractions.

Mixing

Aggregate coke and fines are usually mixed and pre-heated before pitch addition. The pitch may be pre-heated and added as a liquid or as a finely crushed particulate. Mixing temperature is maintained by an oil heater in the sigma mixer and hot air in the Eirich mixer. Batch sizes are up to 5 kg, usually used for one anode.

Vibration Compaction

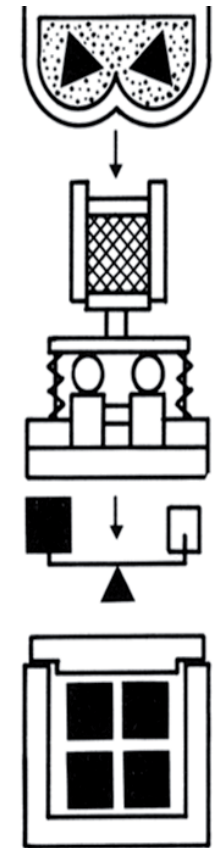
A vibration compactor with adjustable frequency and load are used to compact the green mass. Load cells and strain gauges are used to monitor the energy transfer from the piston to the green mass. This makes it possible to determine the dynamic properties of the pastes.

Baking

Our baking furnace can perform well defined baking cycles with temperatures up to 1300 °C. Four 5 kg anodes may be baked simultaneously. To avoid oxidation during baking, the anodes are covered with coke. Also, if needed, a shielding gas may be used.

Materials Testing

Our lab has test equipment for most standard and non-standard tests used by the aluminium industry and by carbon electrode producers. On a routine basis we build experimental set-ups based on customer requests.



Schematic view of the production line in the Carbon Anode Laboratory

Contact: