

# HOW EASTALCO WORKS PRODUCES ALUMINUM

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## FROM SURINAME TO FREDERICK COUNTY, MARYLAND

The aluminum reduction process begins with bauxite, a clay-like ore, mined in Suriname on the South American continent. Through chemical processes, the bauxite is turned into pure aluminum oxide. The white powder, known as alumina, is a compound containing aluminum and oxygen atoms. The material is shipped to Alcoa's bulk-handling station at Hawkins Point in Baltimore Harbor. From there, rail cars transport the alumina 50 miles west to Eastalco in Frederick, Maryland.

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## POWDER BECOMES METAL

Because alumina is a combination of aluminum and oxygen, the alumina must undergo a process called reduction. To separate the aluminum from the oxygen, electrical current passes from carbon anodes, through a chemical bath, to the cathode lining. When alumina is added to the bath, electrical current separates the oxygen from the heavier aluminum that sinks to the bottom.

Eastalco Works reduces alumina in special electrolytic cells called "pots." These large rectangular containers are lined with a layer of refractories and carbon materials that form the cathodes. This special lining contains the molten material at 960° C, or 1760° F, which is generated by 140,000 amperes of electricity delivered to each cell. In an extremely efficient, automated process called "center feed," the pots are fed continually with alumina. The bath is a mineral called cryolite, which has been liquefied by the heat generated from the electricity. An electrolytic reaction between the alumina and cryolite is created by the electric current which travels from the anode blocks to the cathode liner blocks.

Reduction Pot or Electrolytic Cell

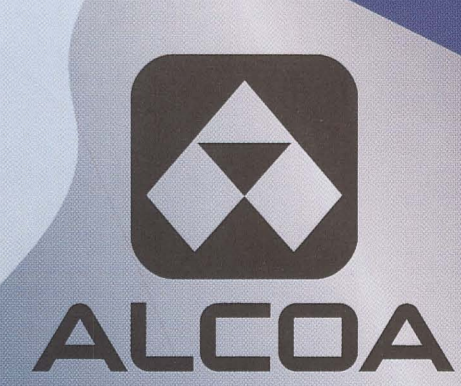
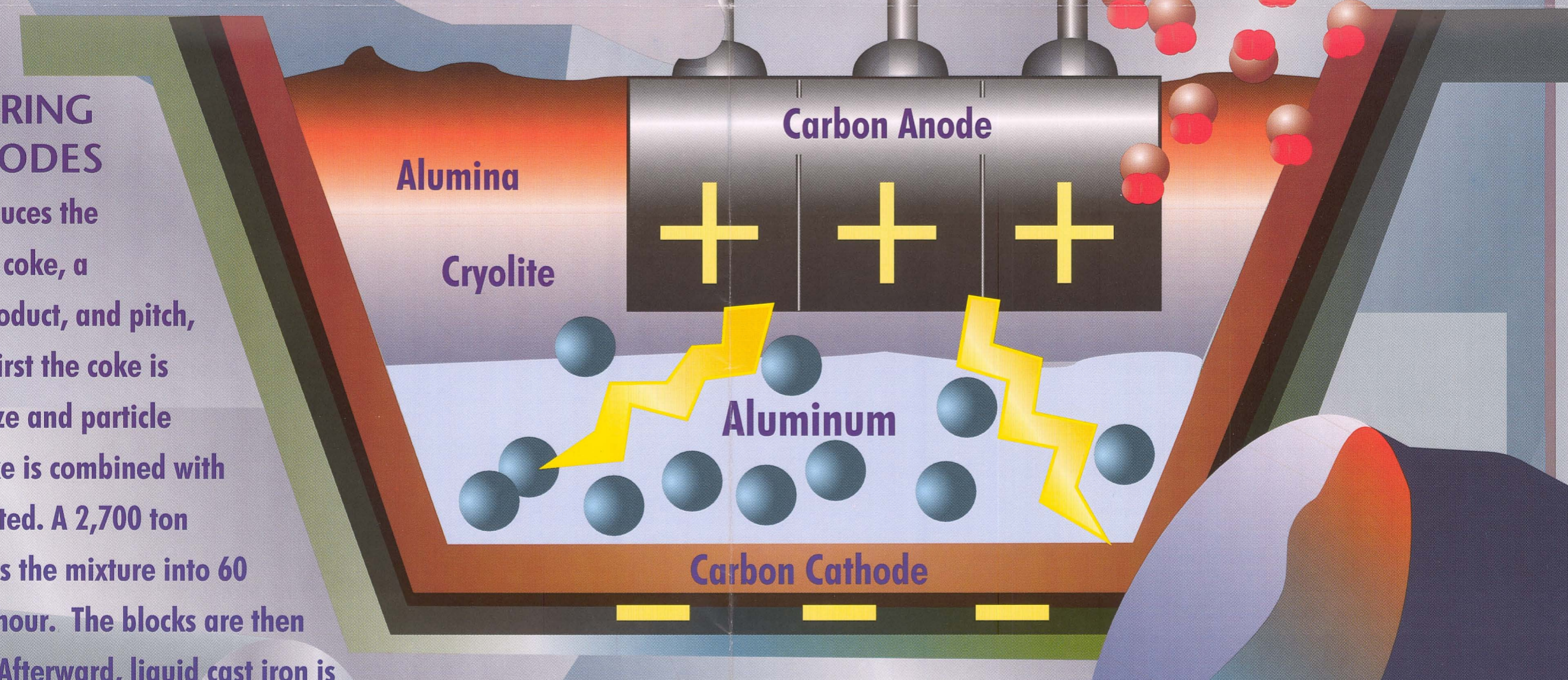
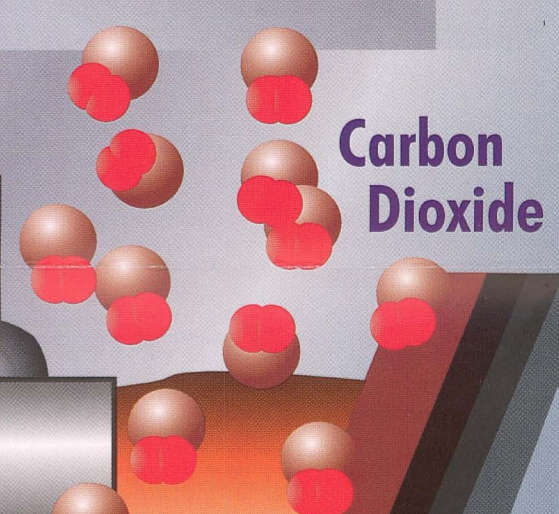
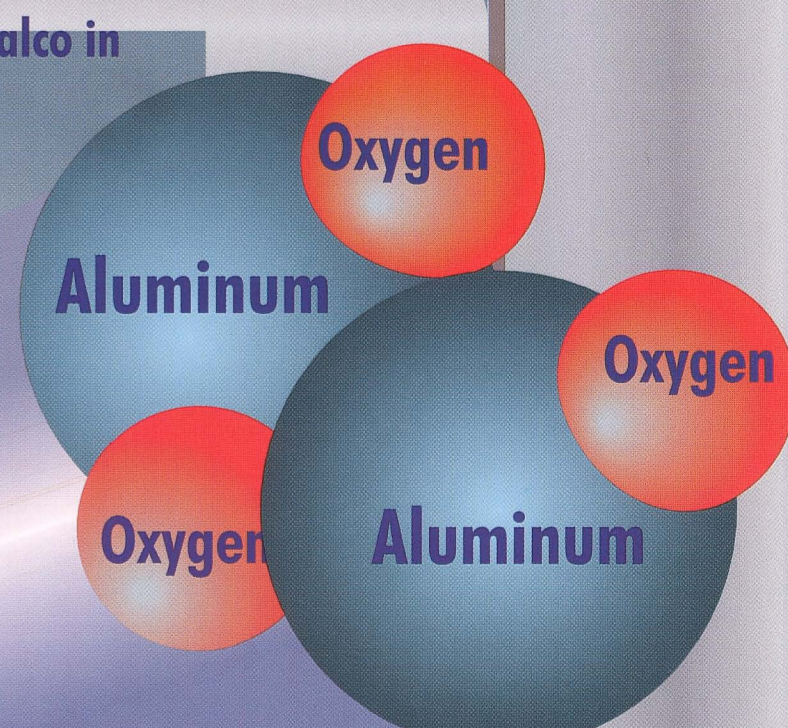
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## MANUFACTURING CARBON ANODES

Eastalco Works produces the carbon anodes from coke, a petroleum-based product, and pitch, a coal tar product. First the coke is crushed to proper size and particle distribution. The coke is combined with liquid pitch and heated. A 2,700 ton hydraulic press forms the mixture into 60 anode blocks every hour. The blocks are then baked in a furnace. Afterward, liquid cast iron is poured around studs to join aluminum rods to the carbon blocks. During aluminum reduction, the carbon anodes combine with oxygen in the bath consuming most of the anode.

## 4 THE END RESULT: ALUMINUM INGOTS, SLABS AND BILLETS

Molten aluminum is siphoned off regularly into large containers and transported to the cast house. There, holding furnaces with large gas burners keep the aluminum in a molten state at 700° C, or 1292° F. The hot liquid is cast into molds where it cools and hardens. Eastalco Works casts aluminum into three different shapes: ingot, slab and billet. Billet is processed further in homogenizing furnaces, where the heated billet acquires special properties such as strength and ductility.



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