شركة دبي للالمنيوم المحدودة

DUBAI ALUMINIUM COMPANY LIMITED

ALL ABOUT DUBAL

Dubai Aluminium joins the ranks of international producers of primary aluminium with the first pour of metal next October.

By mid-1981 the smelter, in the Jebel Ali industrial area of the Gulf Emirate, will be producing 135,000 metric tonnes a year.

But DUBAL is a project with a difference—it will also produce sweet water, by harnessing waste heat from the smelter's gas turbines.

Daily 25 million gallons of water will flow from the desalination plant at full production. Of this, half a million gallons will be used by the smelter. The remainder will fulfill a host of uses in Dubai itself, from irrigation to domestic supplies. For in the Gulf, sweet water itself is a commodity in increasing short supply.

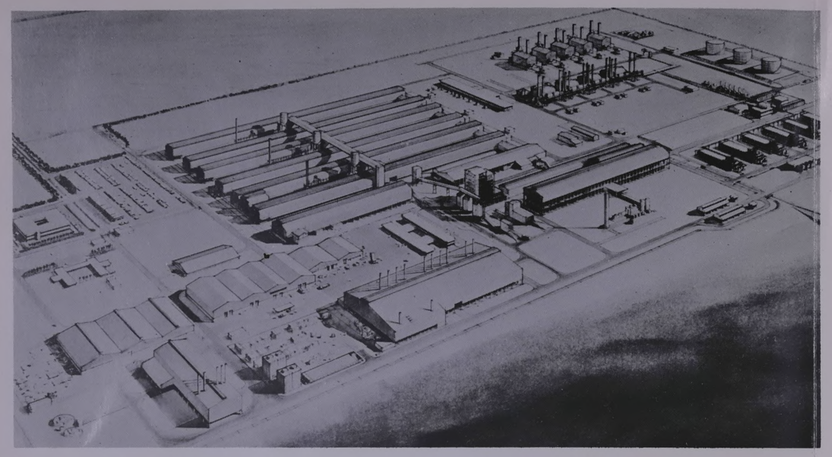
The Dubai Government has an 80 per cent shareholding in DUBAL. The remaining 20% is held by Alusmelter Holdings, a company representing the project's metal off-takers.

The power station, with an installed capacity of 515 megawatts, is the largest industrial gas turbine power plant outside North America.

Thirteen gas turbines from John Brown of Clydebank will generate the energy for the three potlines, and also for the desalination plant.

During the gas-power conversion process, the equivalent of 75% of the energy potential of the gas is normally wasted in the generation of unproductive heat. However, in the case of DUBAL, the 'waste heat' is being channelled to a desalination plant, producing fresh water from seawater which is pumped into the plant from the adjacent Arabian gulf.

Althouth the expected metal production of 135,000 tonnes per annum will produce approximately 114 million litres (25 million Imp. Galls) per day of fresh water in this way, the desalination plant is dimensioned for an eventual capacity of approximately 180 million litres (40 million Imp. Galls) per day, which will make the Dubal desalination plant one of the largest such installations in the world.



There will be four basic products from the cast house: 44lb. ingots from an in-line caster with a rated output of 14 tonnes hourly, and, from two direct chill casters, slab, tee ingot or billet. Forty-four billets can be produced at one drop.

Before homogenising the billets will undergo ultrasonic inspection. Two direct-fired furnaces, each with 50 tonne capacity, will homogenise by batch process.

The original finance for the project—of which the basic smelter itself is budgetted at around 500 million U.S. dollars—was arranged by the London merchant bankers Morgan Grenfell and by Lloyds Bank International. A major role has been played by Britain's Export Credit Guarantee Dept.

With construction well advanced by the main contractors, British Smelter Constructions Limited, the same company which built the smelter in Bahrain, DUBAL itself is beginning to acquire its own corporate identity.

The operating company is headed by Ian Livingstone, former General Manager of Aluminium Bahrain, who joined DUBAL in March. Since then he has become a regular commuter from Dubai to Europe and to the United States, in constant consultation with designers, builders and bankers.

And, with recruitment consultants, he is currently building up a management team for the plant which is expected to employ 1,750 people to produce both metal and water.

Mr. Livingstone, a chartered accountant and former senior executive with an international mining corporation, was awarded the C.B.E. four years ago for his work in Bahrain.

DUBAL itself will have three different computer systems. One will control the reduction process. Another on-line computer system will control stores inventory, payroll, accounts, maintenance, and personnel records. A third system will control the power station and desalination complex.

Alumina for the plant will come from Alcoa of Australia. It will be unloaded at the smelter's own berth, in the new Jebel Ali port, by suction and taken by special trucks to the neighbouring plant.

Petroleum coke, for the anode plant, is stored in two silos each a capacity of 5,000 tonnes.

DUBAL will be supported by a major stores and workshop complex, and will eventually be able to secure additional help from the comprehensive facilities being installed at the new Dubai dry dock.

"Problems of capital formation and energy supply will make it difficult for the industry to expand sufficiently to keep pace with even the more modest increase in demand which is now envisaged," said Mr. Livingstone, "We are confident this environment will help to sustain prices at a more realistic level in future than has sometimes been the case in the past."

HOW ALUMINIUM IS MADE

In the smelting process, metallic aluminium is produced from alumina (Al_2O_3) by electrolytically releasing the oxygen. This electrolytic process takes place in a reduction cell, or "pot," which is shown right in cross section.

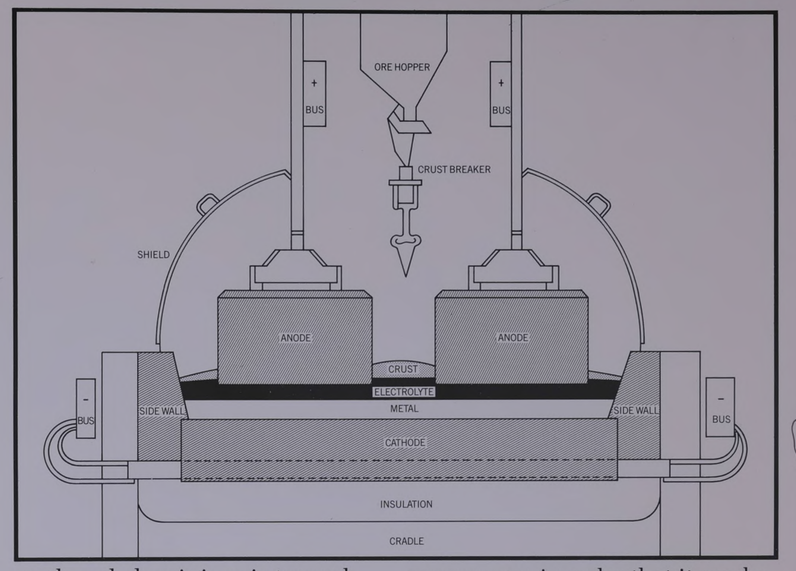
The cell has two basic parts: a cathode and an anode. The cathode assembly is made up of pre-baked carbon blocks which line the cell bottom. These blocks contain steel collector bars, held in place by cast iron.

This assembly and insulating material is installed in a steel container approximately 8.53 metres long, 3.81 metres wide and 1.7 metres in depth called the shell and cradle. The anode assemblies consist of a pre-baked carbon anode block fastened to a cast iron yoke with an aluminium anode bar attached to the yoke.

The cells within a potline are arranged in series with the current consecutively passing through each cell by means of aluminium electric bus bars. Once the cells are placed in production, the electrolytic process requires a bath (as a flux) which is made up of cryolite modified with aluminium fluoride and fluorspar.

However, only the alumina (which is added via overhead ore hoppers) and the carbon anodes (which are held in place above the cathode by yokes and continuously adjusted to remain dipped in the electrolyte) take part in the actual reaction.

Approximately 150,000 amperes of direct current (DC) pass from the anode to the cathode through the molten bath electrolysing the alumina and maintaining a bath temperature of about 960°C. When all the oxygen has been released from the alumina and burned with the carbon anodes producing carbon dioxide gas, which is collected, the remaining pure aluminium settles to the bottom of the cell.



Every 32 hours newly produced aluminium is tapped from the cell into a crucible by means of a vacuum device. A crust forms on the upper surface of the electrolyte which has to be broken every 90 minutes so that more alumina can be added and thereby ensuring the process is continuous.

This process is only the basic electrolytic operation which lies at the hub of a very involved and mainly computer-controlled operation.

Most of the materials mentioned earlier are received at the smelter site in a "ready to use" condition. These are alumina, cryolite, aluminium fluoride, soda ash and fluorspar. However, significant electric power is required, and this has to be generated on site.

The other "ingredients" which require on-site processing prior to use in the production process are the carbon anodes and cathodes and, for this reason, a Carbon Plant is included in the overall project.

The cathode does not erode during the smelting process. The cathodes, which consist of anthracite and soft pitch, are consumed only at the rate of about 1,300 tonnes per annum.

The anode, on the other hand, is consumed during the reduction process and the carbon block which makes up the anode has to go through a rigorous manufacturing and baking programme in order that it can be tough enough to withstand the high temperatures experienced.

To do this, the anode blocks, which consist mainly of petroleum (calcined) coke and hard pitch, after being mixed, heated and pressed into shape, are baked in the anode baking kilns for over two weeks until hardened.

After this, the anodes, which weigh just under one tonne each, are "rodded" (by casting a steel rod into the centre) to give them both a supporting bar and a good electrical contact, and then sprayed with molten aluminium to protect the surface until the block is consumed in the process.

Just under half a tonne of anode block is consumed in the production of one tonne of aluminium metal and the annual production of anodes amounts to over 65,000 tonnes.

The reduction process described is carried out in three "potlines," each potline being accommodated in two buildings, each 380 metres long by 20 metres wide and 15¾ metres high. These buildings—the "potrooms"—are fed with the necessary alumina and fluxes by truck and the power by large aluminium bus bars which encircle each potline.

During the reduction process the fumes from the pots are "scrubbed" using sophisticated dry "fume scrubbing" equipment which allows the valuable fluorides emitted to be recycled.

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