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HUNGARIAN ALUMINA PLANT NEARS COMPLETION

The construction workers of the Almasfuzito plant of the Danube Valley Alumina Industry promised that the plant would be placed in service by 2 November 1950.

The plant changes the character of the Hungarian aluminum industry, inasmuch as more than half the bauxite produced in Hungary may now be processed in Hungarian alumina plants. Before the liberation, Hungarian bauxite was exported; only 3 or 4 percent were processed in Hungarian plants.

In general, the following factors determine the choice of a site for an alumina plant; quality and location of bauxite and coal, and quality and quantity of available water. The Danube Valley alumina plant, which will use the Bayer process, was built with these requirements in mind. Since the bauxite comes from Iskaszentgyorgy, the Bayer process has to be modified somewhat. In size, the Almasfuzito plant is larger than either of the other two plants in operation. In addition, the plant was planned in such a fashion that it may be enlarged to twice its size. The site is connected with the Almasfuzito railroad station by an industrial railroad line.

The bauxite found at Iskaszentgyorgy contains trihydrate, and there are also other factors which require certain modifications of the Bayer process. The equipment of the two existing plants is not suitable for the processing of the Iskaszentgyorgy bauxite. Experiments have shown that the precipitation process, the most important operation in obtaining aluminum oxide, cannot be carried out effectively. Consequently, changes had to be made in the bauxite desiccating process at the Almasfuzito plant.

The large units of the plant are as follows: an independent power plant, an installation for the production of generator gas, a pump station supplying the necessary water, and the equipment to manufacture the alumina.

The total capacity of the power plant is sufficient to supply the necessary steam and power for the alumina plant, and to deliver some surplus power to the national power network.

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The boilers are fired with low-grade coal, are built for medium pressures, and are equipped with modern dross removers.

The generator utilizes the Koller system. The product, raw gas, is purified by an electric tar and oil separator and, thus, a very pure gas is obtained. The by-product is ready for industrial use.

The waterworks is very modern. The water of the Danube is relatively cool, even in the summer, and it will be possible to keep the water, used for cooling, at an even temperature.

When the bauxite is delivered from the mine, it has a moisture content of 17-22 percent. It is dumped, and a lifting mechanism transports it to warehouses several stories high. The crushers are located on the lower level of the warehouse so that, during the process, the bauxite follows a downward route. Automatic equipment transports the bauxite to the cylindrical crushers. There are rough and fine crushers. The precrushed bauxite is then forwarded to the raw bauxite warehouse.

This warehouse is unique, both in size and transporting equipment, and provides such perfect warehousing that hardly any alumina plant matches it.

The precrushed bauxite is either stored in this warehouse or forwarded immediately to a stationary roasting furnace, provided with rollers. These furnaces are essentially the same as those used for the roasting of pyrite. They are several stories high, cylindrical, and with partitions forming several floors. The material is forwarded by a shovel-type installation, mounted on a revolving axle. The material is, thus, slowly carried from level to level, through appropriate openings. The furnace is heated by generator gas, streaming in from the opposite direction. As a result of the slow movement and constant temperature, all particles are heated evenly, the water, mechanically held in the crystals, is evaporated completely, and the water of crystallization is reduced uniformly. This procedure insures a good, final rate of precipitation.

Conveyer belts take the dried bauxite to one of the mills, where it is ground to the consistency of cement. The bauxite is sorted in the mill by a fan-sieve installation and is transported to silos. The silos have a sufficiently large capacity to allow the storing of enough material for several days, so that production will not be interrupted. The bauxite is then weighed and transported to large mixing tanks, where it is mixed with sodium hydroxide.

The mixture is pumped into autoclaves where coils heat it to a point where the aluminum oxide and the hydroxide will form sodium aluminate.

The mixture in the autoclaves is then forced into diluting tanks by pressure. It then goes into Dorr precipitation tanks, several stories high. There are five chambers in the tanks, and the mixture is slowly pushed from chamber to chamber. The process results in the purification of the sodium aluminate solution. The solution is then drawn off, cooled, and forwarded to the mixing tanks.

The red precipitate, precipitated and separated in the Dorr tanks, is filtered and washed in one of the Kelly filters. It is dissolved, and the sodium hydroxide in the solution is recovered for future use. This process saves foreign exchange. The pure sodium aluminate is cooled by three Krötig-type coolers to the necessary temperature for further treatment.

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The cooled sodium aluminate now goes into a mixer where the aluminum hydroxide is separated. The aluminum hydroxide is pumped into a hydroseparator, and the aluminum hydroxides of various degrees of fineness are separated. The hydroseparators are very large tanks, equipped with mixing equipment. The lighter precipitates and sediments can be separated from the heavier ones. The precipitates which have a smaller specific gravity go back into the mixing tanks and there facilitate the precipitation of the aluminum hydroxide which is present in the sodium aluminate solution. The heavier portion of the precipitation is carried to one of the double Imperial filters.

These are rotary drums, covered with a filtering material which, because of several partitions, filter, wash, and dry in one revolution. The filter first absorbs the sodium aluminate, and the aluminum hydroxide is separated and left on the surface of the filtering agent. This aluminum hydroxide is washed with water, and the liquid is then pumped off. The purpose is to obtain a purified and dry aluminum hydrate on the filter. The hydrate then goes into storage or into the calcinating drums.

The calcinating drums are rotary drums which are lined with refractory bricks equipped with recuperator piping. A temperature of 1,300 degrees centigrade is reached with the generator gas, and the aluminum hydroxide loses both the water which is mechanically held and the water of crystallization. It leaves the calcinating drum as Al_2O_3, or alumina. To recover the large amount of heat in the alumina, it is dropped into the above-mentioned recuperator pipes. A stream of air to which the greater part of the heat is transmitted is directed through these pipes from the opposite direction. This results in better utilization of the heat and in the cooling of the alumina to the point where its transportation raises no special problems. The alumina is then transported to storage places. Pneumatic equipment transports the material to railroad tank cars. In addition, there is equipment underneath the warehouses to permit the alumina to be drawn off directly into sacks.

It was pointed out above that the Imperial filters separate a sodium aluminate solution. This solution is pumped into a Vogelbusch-type evaporator. The evaporator concentrates the sodium hydroxide solution, which becomes diluted during the manufacturing process.

A lake of approximately one million cubic meters also belongs to the plant. The calcified red precipitate will be dumped here.

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