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Cost Savings by Improved Filtration and Washing of Al-Hydrate Product

The filtration and washing out of the Al-Hydrate product in alumina refinery plants is usually performed on pan filters since this vacuum rotary filter type is well adapted to the filtration of very coarse particles. It is the target to achieve a filter cake that is as dry and free of soda as possible. Because of the wash efficiency, two wash steps which are both done on pan filters are in general recommendable to get the requested soda content in the cake.

In the last decade BOKELA has introduced a new generation of rotary vacuum filters such as disc, drum and pan filters with new and innovative design. With this new generation of pan filters the filtration and washing out of the Al-Hydrate product is performed with significantly improved filter capacity and reduced maintenance and operation cost compared to filters of conventional designed pan filters.

Pan filters of modern design have a lot of innovative features like the BOKELA Forced Feeding System, the fast flow cells or the effective heel re-slurry system. This new pan filter type has filtration areas of up to 68 m² and is designed to reach high solids throughput together with really efficient cake washing and dewatering. The even filter cake and the excellent hydraulic characteristic of the fast flow cells improve the cake wash efficiency and reduce the wash water consumption by 25% which leads to significant saving of evaporation cost. Steam can be used to improve the cake washing and to further reduce the moisture content of the cake. The effective heel re-slurry system provides longer cycle times between filter cleaning and for improved cloth lifetime which both improves the filter availability. The maintenance work is more comfortable thanks to swivelling filtrate pipes which permit to dismantle the control head in a short time and a well proven control philosophy makes filter operation safe and reliable. Modern pan filters impress with very innovative components which ensure the longest service lifetime together with an optimised energy and consumables consumption. Thus, energy consumption and operation cost are reduced by 10 – 15 % compared to pan filters of conventional design.

Another very promising option which is enabled by the new filter technology is to replace the first washing step on pan filters by filtration on more compact and more efficient and feasible vacuum disc filters and re-slurrying the filter cake with wash filtrate from the pan filter. The use of disc filters in the first step, which are much more capable to handle large filtrate streams, relieves the pan filter and leads to much improved cake wash conditions. Such a process leads to improved solids purity, savings in costs and maintenance.

The lecture presents the design characteristics of the pan filters which are relevant for operational cost. A comparison of main operational cost factors elucidates how modern filter design leads to significant savings in operational cost.