

Fit for future – Design of the BOKELA boozer and spoker boozer disc filter

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Abstract



Filtration of coarse and fine seed downstream of secondary or tertiary thickeners or in continuation of hydrocyclones, influence the efficiency, the operating cost and the quality of the final product in Alumina precipitation circuits remarkably. Seed filtration is characterised by the tremendous flow rates which have to be processed on the filters and by changing product characteristics such as slurry density, grain size, etc. Consequently, the filtration equipment used must ensure a high availability and has to be capable to cope with high slurry feed rates and with slurry characteristics which can change in a wide range during filter operation. With the introduction of the Boozer disc filter two decades ago BOKELA set a new standard in seed filtration with decisively improved filter capacity and reduced maintenance and operating cost. Now, BOKELA have redesigned and upgraded this disc filter type. The new design improves filter operation, filter maintenance and economy (OPEX and CAPEX)

Keywords: Seed filtration; disc filter; lightweight filter segment.

1. Introduction

Big diameter disc filters are the most advanced filter technology for seed filtration. They were developed and installed for the first time in the early 70's. With the Boozer disc filter, BOKELA developed a new generation of big diameter disc filters which set a new standard for coarse and fine seed filtration, upgrading this disc filter type. Based on 20 years of operational experience with numerous filter units in many alumina refineries, but also in other industries, the design of the Boozer has been modernized to make this successful filter type fit for future.

2. Boozer disc filter – The first generation

Beginning with the first supply of 6 Boozer disc filter units in 1995, BOKELA started a new era for high performance disc filters in seed filtration. Today Boozer disc filters are operated for fine seed, coarse seed and even for product filtration in numerous Alumina refineries but also for applications in other industries worldwide.

Based on the experience gained in more than 250 filter optimisation / revamping projects for all major filter types and OEMs, BOKELA have developed the Boozer which has established a new standard for disc filters incorporating a number of innovative changes to conventional design practice. Most of these innovations have been made to resolve capacity and performance problems related to hardware bottlenecks and/or areas of poor hardware design in vintage disc filters. The outstanding hydraulic characteristics of the Boozer disc filter were achieved by improving each detail of the vacuum disc filter design such as filter discs and segments, filtrate pipes, centre barrel and bearings, filter trough, control head and cake discharge.

This has led to the following results [1]:

- Low wear metal segments with massive hydraulic capacity to process the large filtrate flow
- Metal segments of only 19.5 kg with quick release bayonet connections without tie rods
- Quick fit filter bag system with cable ties
- Filters designed to use poly bags which are easier to replace and more cost effective,
- Permanent walkways to allow easy access to replace segments with torn cloths
- Centre barrel and bearings designed for the high loads encountered with high capacity and high speed
- Gearbox and motor designed for high loads at low speeds
- Filter trough designed to eliminate agitators by being self-agitating
- Level control system to prevent overflow back to feed tank
- Control head with low pressure losses (low wear) at high capacities, and
- Back-suck on the filter cloth to prevent damage on the scrapers during cake discharge.

Consequently all the above changes have resulted in:

- Extraordinarily high performance capacity
- Drastically improved cake pickup due to the high vacuum achieved inside the disc
- Better cake moistures than other filters of the same area at the same tonnage
- Excellent discharge of the cake with 95 to 100% reporting to the product
- Vacuum always being at appropriate performance level
- High operational safety and reliability
- Low maintenance and operating costs.

3. More in size, less in weight – The new Boozer XI

After 20 years of operational experience with numerous filter units in many alumina refineries, BOKELA have redesigned and upgraded the Boozer to make this successful filter type fit for future.

It was the target of the new design to improve the high standards operators associate with the Boozer by simultaneously reducing cost and weight. The motto of the new design was “high performance for less money”. The following targets have been the guideline for the design of the Boozer XL:

- High – i.e. same or even increased – performance capacity
- Light filter segment made of polymer considerably below 15 kg
- Reduction of total weight of a unit
- Further improvement of filter operation and maintenance
- Significant cost reduction

3.1. Modifications and technical data

To achieve this ambitious aim BOKELA engineers have enhanced the proven and successful Boozer filter design and have created the Boozer XL (figure 1) which incorporates a series of new design features and improvements.

As main characteristics of the new design can be named

- High specific performance capacity
- Increased filter area on identical footprint
- Reduction of total unit weight
- Further improvement of filter operation and maintenance
- Significant cost reduction.

5. Reference

1. Hahn, J., Bott, R., Langeloh, Th., "New performances in seed filtration by modern filters: a feasibility review", 6th Alumina Quality Workshop 2002 , Brisbane, Australia.