

LAROX HORIZONTAL VACUUM BELT FILTER WITH SIDE VACUUM

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1. Introduction

Horizontal belt filters are typically used for separation of relatively free filtering solids where good post treatment is required. The horizontal belt filter is a continuous filter with an endless cloth supported on a grooved carrier belt. The belt and cloth are driven around two rollers across a series of evacuated suction boxes. The feed suspension is introduced at one end of the filter and deliquored to produce a cake at the other end.

The benefits of using horizontal belt filters are good cake washing, continuous and visible processing, fully automatic operation, flexibility, high capacity and relative high speeds of operation. If required, horizontal belt filters enable efficient counter-current washings to minimize the usage of wash liquid.

The horizontal belt filter has applications in the following:

- Metal concentrates
- Mineral sands
- Tailings
- Coal
- Iron ore
- Alumina
- Chloride processing
- Nickel and Cobalt refining
- Platinum group metals
- Zinc processing
- Many other applications in the Mining and Metallurgy industries

2. Operating Principle of a Horizontal Vacuum Belt Filter

2.1 Cake Forming

The slurry to be dewatered is evenly distributed onto the filtering surface. Gravity assists the cake formation and the feed can be introduced in multiple stages.

2.2 Cake Washing

Once the cake is formed, wash liquor/water can be introduced onto the top of the cake via a wash launder or sprays. Multiple wash stages, co-current, counter-current or direct washing can be added by increasing the length of the filter.

2.3 Cake Drying

Once cake forming and cake washing have been completed, drawing air through the cake to displace filtrate can further dewater the cake. Hot air, vibration, mechanical compressing and microwave drying can be added to improve process results.

2.4 Conventional Rubber Belt Principle

With the Rubber Belt type horizontal filters, the cloth is supported by a grooved rubber belt. The vacuum is applied via a vacuum box under the belt and the filtrate runs along the grooves towards the centre of the belt where it passes through a series of holes into the vacuum box. The vacuum box is connected to a filtrate separator. See Figure 1, p2.

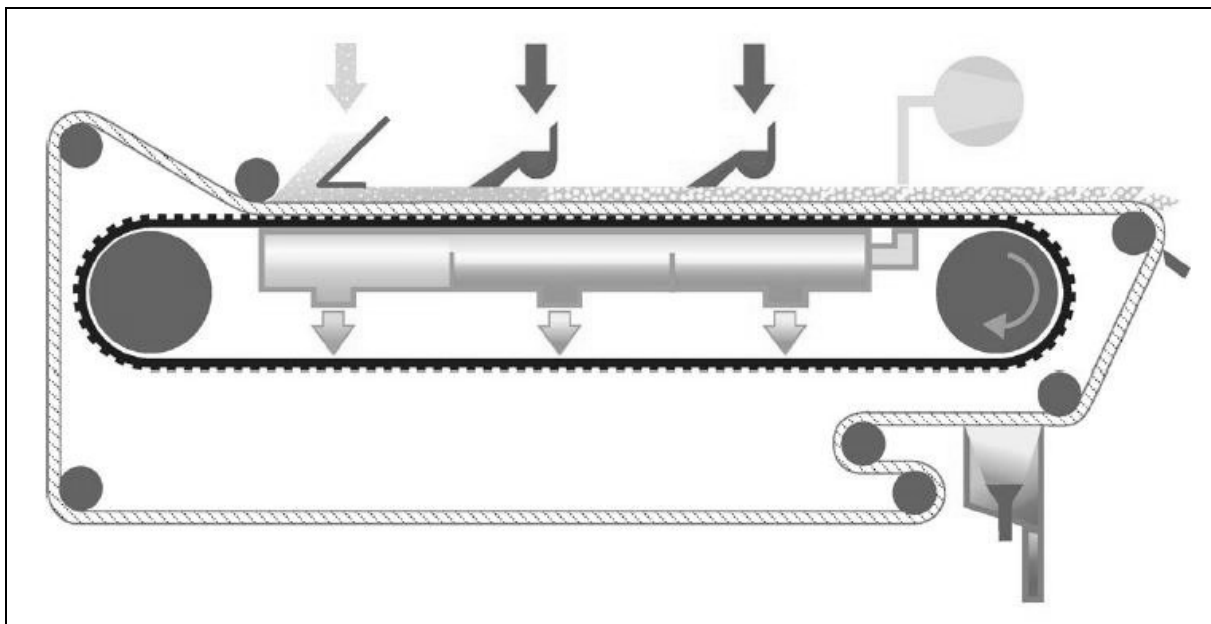


Figure 1. HVBF Operating Principle

2.5 Larox Rubber Belt with Side Vacuum Principle

As with the RB, in the RB-SV type horizontal belt filters the cloth is supported by a grooved rubber belt. The vacuum is applied via a vacuum box under the belt and the filtrate runs along the grooves to the side of the belt where it passes through a series of holes into the vacuum box. Filtrate is separated in the vacuum box and there are connections to the vacuum and the filtrate systems. See Figure 2, p3.

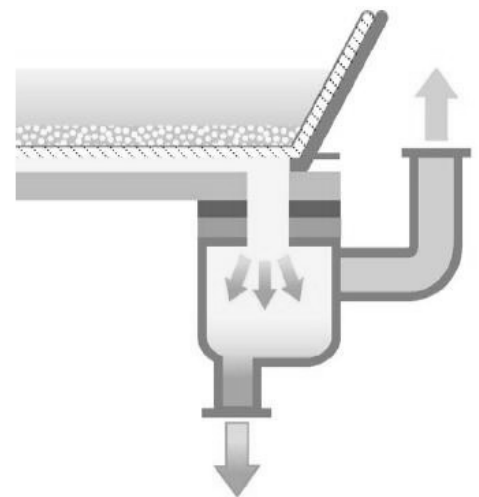


Figure 2. RB-SB Principle

3. Design Changes Made

3.1 Vacuum Boxes

The Larox RB filter is provided with a side mounted vacuum box. The traditional vacuum box was mounted in the centre of the machine. With the vacuum box moved to the side it is more accessible for cleaning and maintenance via removable panels.

Loose seal belts made from low friction, wear resistant materials run in UHDPE grooves and are designed for long life and easy maintenance.

An added benefit of the vacuum box's new location is the fact that the overall height of the filter is reduced as there are no requirements for space under the belt for lowering of the vacuum box.

3.2 Belt Support

The RB-SV feature roller support of the rubber carrier belt. By matching the roller spacing to the belt rigidity, rollers provide a stable filtration surface with low friction and power requirements.

Unlike table support or sliding belts support systems, no seal water is required to lubricate between the support and the belt. This results in a much cleaner installation whilst reducing potable water consumption. The only sliding contact point is at the vacuum box where two seal belts protect the belt and seal the vacuum to ensure maximum carrier belt life.

3.3 Rubber Carrier Belt

The rubber carrier belt is specially manufactured with a fabric carcass in the bottom of the belt with drainage channels for cloth support and filtrate collection on the upper surface.

Due to the location of the filtrate holes on the side of the rubber carrier belt, the rubber belt is now reinforced across the total width thus increasing belt life.

The carrier belt is no longer executed with fixed shoulders. The advantage is that the belt can be executed thinner and that the allowed bending radius is smaller.

4. Conclusion

The rubber belt horizontal filter is a vital part in everyday production operations, albeit Mining and Metallurgy or Chemical Process Industries.

The conventional rubber belt filter had some inherent problems in its workings: ergonomics being the biggest problem. With the focus on a Health and Safety, Larox has reinvented a trusted and proven technology.

By taking the vacuum box from the centre of the machine and relocating it on the side of the filter, a series of benefits and improvements were realised.

The maintenance and cleaning of the machine is now much simpler, easier and cleaner.

With the belt support that was improved upon, the rubber belt filter is no longer a large water consumer but in fact a water free machine with no issues of water wastage.

The rubber belt filter gives the optimal results with none of the prehistoric hassles associated with the conventional horizontal rubber belt filters.

5. References

Larox internal literature.