

Lamella Separator for Sedimentation Clarification in Limited Space

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Zöls GmbH in Fürstzell is a modern and advanced company. Their production focuses on the processing of sand and gravel. At the company's modern processing facilities, up to 400 t of high quality aggregates are processed per hour. The waste water from this production process contains fine particles of loam and silt. Leiblein (Germany) was contracted to install a system for the efficient removal of the particles from the waste water, allowing its reuse in a closed circuit.

Integration of the existing sludge press

The installed water treatment system consisted essentially of a settling pond and a modern belt filter press. This combination was no longer efficient owing to the increasing consumption of process water.

The objective was to integrate this equipment in a new system for the realization of a largely automatic water treatment process at low costs.



fig.1: installation of the treatment plant with Leiblein lamella separator

The waste water from the various cleaning steps is collected centrally and fed to the Leiblein lamella separator with the help of a centrifugal pump. To promote settling, a flocculant is added to the waste water upstream of the lamella separator. A static mixer is used for optimal mixing of the flocculants into the stream of water. The sediment is extracted with a sludge pump and sent to the belt filter press for further dewatering. A scraper is used to homogenize and level the sediment. In addition, extraction of the sludge is monitored with a sludge level measurement based on



fig. 2: clean water weir in the Leiblein lamella separator

the vibrating fork principle. The cleaned water flows in freefall into a clean water tank and is returned to the processing plant from here. Here any water losses are compensated with the addition of fresh water

Lamella separator for sedimentation (function specification):

The dirty water gets into the inlet channel and runs downwards. In the middle of the separator the flow is reversed and streams up through the lamellae, passes a weir and gets out of the separator. During the passage the particles settle down onto the inclined lamellae (sedimentation) and slide into the sludge funnel. Afterwards the water can be returned to the process because solids are removed from the medium sufficiently.

For separating finest particles (turbidity) from the water, it could be necessary to use flocculants. Also the clarification surface and the dimensions of the lamella separator could be reduced.

Leiblein lamella separators, fig.3, have a high efficiency. They are designed and produced according to the customer's requirements. Leiblein lamella separators are robust constructions and easy in maintenance. The materials and the coatings are chosen according to the medium.

The dirty water flows upwards through the inclined lamellae. On their way up the speed of the particles is lower than the water's speed. And so the particles settle down onto the lamellae. The clear water flows up and the particles (sludge) slide down. Fig. 4 shows exemplary the way of one particle. The vectors represent the speed and the direction of the water and the particle. The resultant of both is the sedimentation rate.



fig.3: Leiblein Lamella Separator

Functional scheme

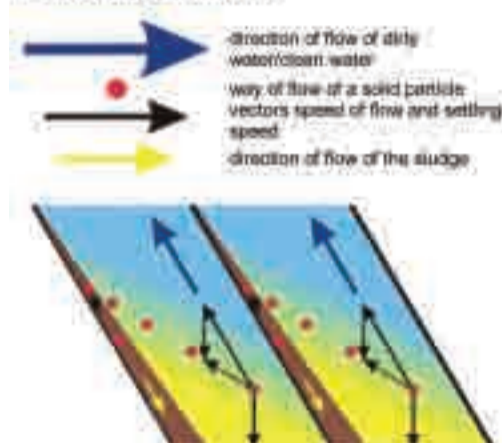


fig.4: Functional Scheme

Clarification in limited space:

In order to manage the task a set-up surface of about 4 x 6 m was required for a LEIBLEIN lamella separator. If you had tried to use a conventional circular thickener for this purpose a basin with a diameter of about 24 m would have been necessary.

Generous design:

The plant is designed for a flow rate of water of about 400 m³/h. Additionally to the little space required, the minimized use of a flocculant is beneficial in particular: in contrast to a circular thickener the consumption is reduced by about 30%.

Optimal sediment discharge:

The sediment should have been thickened in the lamella separator as much as possible. Ideally the sludge should have been nearly pasty. Here a compromise had to be made between the maximum sludge density and a still pumpable matter. In the application described here, the consistency of the sediment is adjusted to meet the requirements of the downstream belt filter press. By using an appropriate sludge level measurement this aim could be achieved reliably.

A look ahead:

The applied concept makes it possible to react to a possible increase in the amount of water properly. The plant is extendable modularly, i.e. by using further lamella separators which can be run parallel the treatment capacity can be doubled or multiplied respectively.

Satisfied customers:

The modular concept and an exact preparatory planning reduced the time for installation to one day. The lamella separators were directly unloaded from both low-loaders together with the required steel construction, the operation platform and a ladder and were fixed to the prepared foundations. The integration of the lamella separators into the given system planning was uncomplicated. A reaction to adjustment and change requests in the process flow can happen relatively spontaneously and easily.