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Dynamic inline mixer for optimized sludge dewatering

The efficient flocculant mixer achieves a significant reduction of operating costs

Conditioning of the sludge to be processed with polymeric flocculants is a precondition for the mechanical dewatering of sewage sludge. The focus is typically on the optimal flocculant dose as this is the factor that influences directly the dewatering results and flocculant consumption, and thus the largest portion of the operation costs.

Turning the attention to sludge conditioning as the determining process step for dewatering, it becomes apparent however that also the mixing intensity and flocculant solution concentration have a significant impact on dewatering results and flocculant consumption.

Dynamic inline mixers are a suitable solution to increase the mixing intensity compared to frequently used static mixers or slowly running stirrers in big-volume tanks. This compact type of mixer operates at a rotary speed of up to 3000 rpm directly in the sludge feed line of the dewatering unit.

Advantages of dynamic mixers:

The comparably high mixer speed achieves a turbulent and thus ideal admixture of the flocculant. All solid particles have contact with the flocculant and the flocks all have virtually the same size. The formation of very small flocks or big instable agglomerates is minimized with the result of an increased water loss of the flocks in the dewatering machine. Due to the faster loss of water, it is possible to increase the throughput of the dewatering unit or optimize the dewatering degree.

With a specific energy input of up to 20 kWh/t_{DR}, even highly viscous liquids can be mixed under turbulent conditions. The concentration of the flocculant solution can therefore be increased from typically 0.2% to 0.4% effective substance, i.e. the volume of dilution water for preparing the flocculant can be halved. This reduces the hydraulic load on the dewatering system, which in turn has a positive impact on the dewatering degree. If the flocculant is prepared with drinking water, also the current costs for the dilution water can be halved. Furthermore, a smaller size of the flocculant preparation plant is sufficient for the same maturation time. The smaller design makes the plant cheaper and the storage stability of the highly concentrated flocculant increases significantly.



The dynamic HUBER Inline Polymer Mixer IPM

Practical experience

The sewage treatment plant of the Russian spa town Bad Orb has operated a screw press for digester sludge dewatering since 2016. The screw press is used three times a day for 4-5 hours with a sludge volume of 5 to 6 m³/h. The dewatering properties of the digested sludge were increasingly influenced negatively by the processed grease separator material from restaurants and co-substrates.



HUBER Inline Polymer Mixer IPM 100 upstream of a screw press

food industries. With a flocculant volume of 15 kg/t_{DR}, the dewatering degree reached was frequently only 21% DR.

Since the integration of the dynamic HUBER Inline Polymer Mixer IPM upstream of the screw press, the dewatering degree has increased by 3% and the specific flocculant demand has been reduced by approximately 15%. The dynamic mixer is operated with a rotary speed of 2200 rpm and has a power consumption of 2.2 kW. The effective substance in the flocculant solution is 0.3%.

The new HUBER Inline Polymer Mixer has also considerably improved the operational reliability of the sludge press. The previous mixing unit became frequently clogged with contaminants contained in the external sludges. Now, such problems belong to the past.

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