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Fine screening – the cost-effective alternative to primary settlement tanks

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Abstract

In the discussion about limited resources and energy saving in sewage treatment plants alternative sewage treatment methods are increasingly becoming a focal point. Fine screening represents a highly interesting alternative to primary settlement tanks as fine screening can achieve the same removal rates on a much smaller footprint and with significantly lower investment costs.

Keywords

Primary settlement tank, fine screening, screen drum, mechanical screening;

The task of primary settlement tanks is to mechanically remove very fine particles that settle on the bottom or float to the surface. The solids that settle on the tank bottom are primarily organics. After removal from the tank bottom this material, also called primary sludge, accumulates in the pump sump from where it is usually delivered to the digester. The two disadvantages of primary settlement tanks are high space requirements and high investment costs.

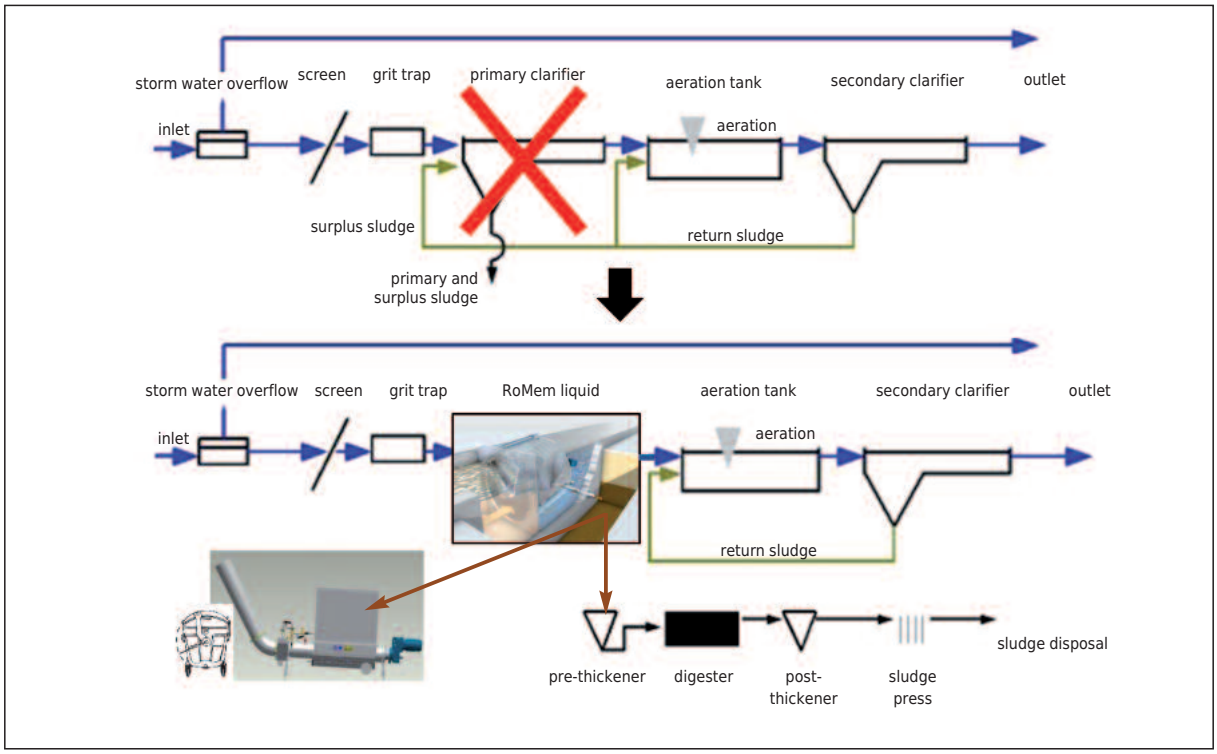


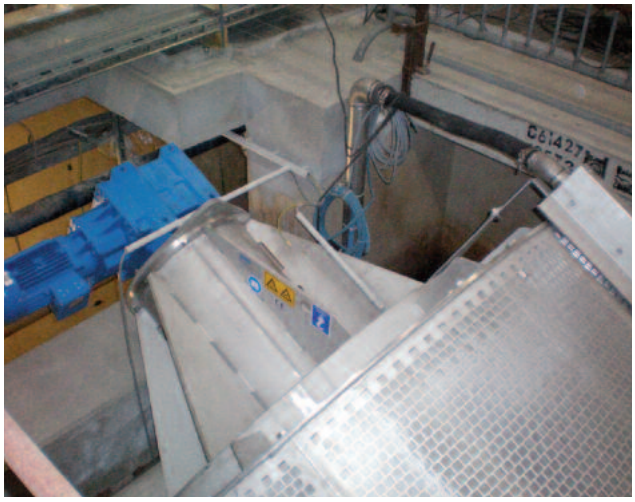
Fig. 1: Process diagram of a sewage treatment plant using fine screening instead of a conventional primary settlement tank [1]

Fine screening with up to 0.2 mm apertures can achieve the same solids removal rates on a much smaller footprint and with significantly lower investment costs. For this application, we have chosen the ROTAMAT® Membrane Screen RoMem liquid, a screen that has been designed on the basis of our proven ROTAMAT® screening systems. Due to its drum-shaped screen basket and installation angle the RoMem liquid screen provides a large screening surface. The flow resistance and headloss of the screen are therefore low even with higher flow rates.

In contrast to common screen designs (slots or perforations), our RoMem liquid screen is equipped with square mesh which can retain even very small particles due to its two-dimensional structure. Even very fine slot screens are by far not able to achieve the same retention. In addition, square meshes have a relatively large free surface and are therefore able to cope with high hydraulic capacities and nevertheless achieve excellent separation results.

Another advantage and special feature of the RoMem liquid screen is that the screenings are discharged either by gravity or by pump and delivered to further treatment facilities. Like with primary settlement tanks the separated solids can be used as a co-substrate for sludge digestion. Optionally, they can be further dewatered in a wash press and discharged into a container. If the screenings are passed on to the sludge treatment system, the fibrous material contained can be introduced as additional bulking material. Compared to sludge treatment without introducing fine screenings, increased solids contents can be achieved with reduced coagulant agent volumes.

As mentioned above, the screenings can be further dewatered in a WAP Wash Press and discharged into a container instead of introducing them into the sludge treatment system. The WAP Wash Press achieves dewatering results of up to 35% dry residue. The removal of solids and their disposal as screenings reduces the hydraulic load on the sludge treatment system. As fine screening can achieve the same removal rates on a smaller footprint and with lower investment costs, it is a highly interesting alternative to primary settlement tanks. Fine screening should especially be considered as an economical and efficient option for upgrading smaller sewage treatment plants without preliminary treatment. Due to the high removal rates that can be achieved with fine screening the load on downstream biological treatment systems can be reduced and their clarification capacity increased accordingly. The screenings can be used for sludge digestion to increase gas production. Alternatively, they can be dewatered in a wash press before disposal.



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Subject to technical modification
0,05 / 1 – 4.2014 – 4.2014

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