

Cutting edge effluent tertiary treatment by the Sheaf Filter

Background: A Sheaf Filter pilot was installed at the Maayan Zvi effluent reservoir. The reservoir receives mainly secondary effluents from Hadera wastewater treatment plant (WWTP) and Maayan Zvi WWTP, as well as floods from Dalya stream; and brackish water from Maayan Zvi saline well. The effluent contact time in the reservoir is 60 days, and the chlorination concentration is 1-1.5 ppm (as free residual Cl). The effluent quality in the reservoir is: TSS=6 ppm; BOD=3 ppm; COD=26±2 ppm; TOC=7±0.1 ppm; TN=6±0.3 ppm. The Sheaf filter was installed after existing 130 µm screen filters (Amiad, Israel)

Challenge: Effluent, which is a mix of dissolved and suspended organic and inorganic compounds, is a challenge for any filter. Our goal was to achieve a high quality filtration of suspended solids in the range of 1-5 µm with the automatic self-cleaning Sheaf Filter, demonstrating that the Sheaf Filter is a viable solution for tertiary treatment of complex matrixes, such as effluents.

Solution: Filter of 4 sheaf with an average (± 2 -SEM) flow of 22±0.3 L/min and ΔP 0.62±0.01 bar, respectively, for almost 100 cycles, was washed every 20-30 min according to defined rise in differential pressure (set to 0.1 bar). Figure 1 presents the turbidity removal profiles at the middle (10-15 min) and at the end (20-30 min) of each of the 100 filtration cycles.

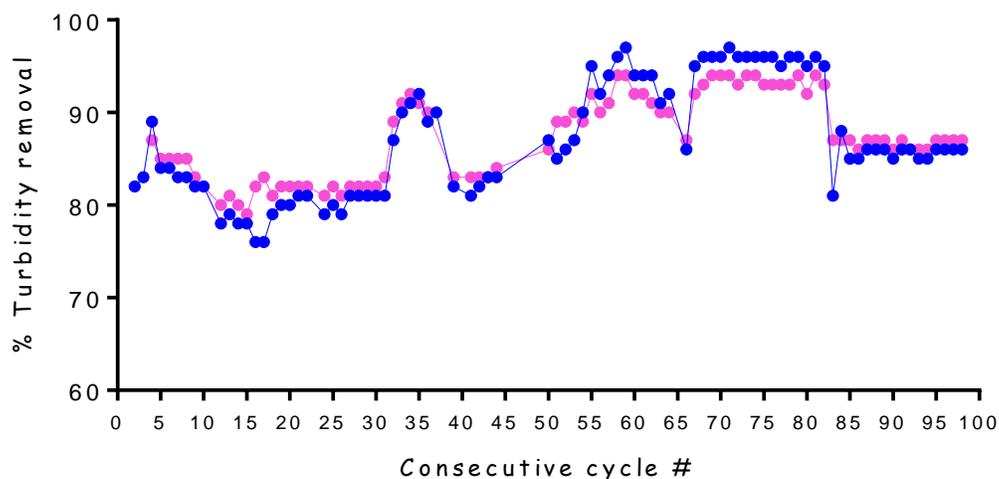


Figure 1. % Turbidity removal (NTU) profiles for sheaf filter effluent pilot at Maayan Zvi. Profiles represent the middle (• 15 min) and the end (• 30 min) of each of the 100 filtration cycles.

The effluent quality presented in Figure 1 shows that the average ($\pm CV$) turbidity removal was 87%±10%. The particle removal, presented in Figure 2, shows that the average removal for particles above 1 µm was 80%±7%, thus amplifying the results obtained for the secondary

effluent matrix. Nonetheless, working with higher differential pressures demonstrated (although not presented here) that the filtration quality can be further improved.

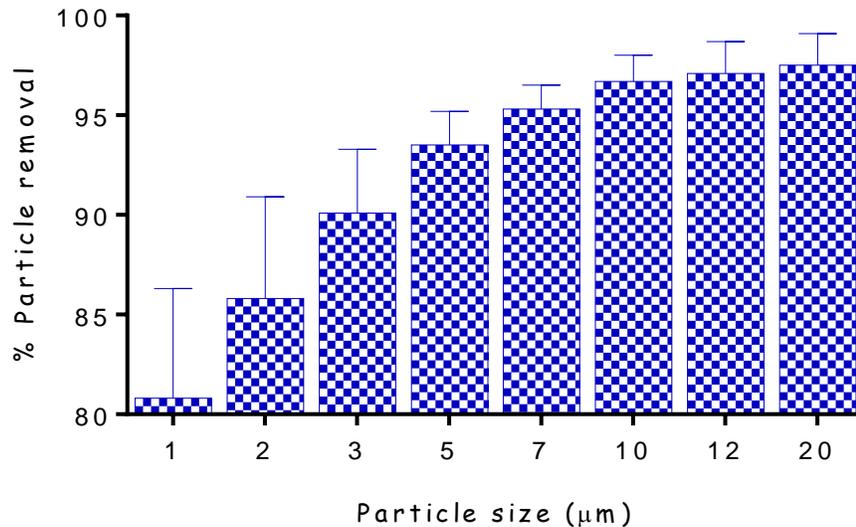


Figure 2. Particle count (LS20, Lighthouse, USA) results (average ± SEM) for Sheaf Filter pilot at Maayan Zvi effluent reservoir.

Conclusion: The Sheaf Filter pilot placed at Maayan Zvi effluent reservoir demonstrated the ability of this Filter as an advanced polishing technology, and even as a tertiary treatment solution for complex matrixes, such as effluents. The filter showed >87% turbidity removal and >80% removal for particles above 1 µm. The results presented here prove that the Sheaf Filter is an example of cutting edge technology, as well as a sustainable alternative for filtration of suspended solids in the range of 1-5 µm as present in effluents.