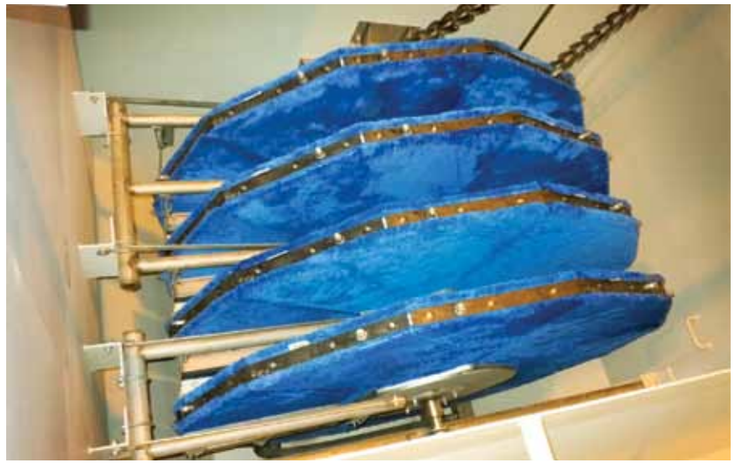
Pilot Study Shows Value of Cloth Media Filters



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With more than 20 years of application experience in wastewater tertiary processes, cloth media filtration (CMF) has demonstrated high solids-loading capacity, large hydraulic throughput, a small footprint and high-quality effluent. To verify whether CMF can effectively treat primary influent and attain significant downstream energy savings, in addition to energy harvesting through carbon diversion, a pilot study was conducted at the Rock River Water Reclamation District in Rockford, Ill., from April to August 2014. The testing primarily was designed to understand the hydraulic and solids-loading capabilities of two filtration media—standard-fine cloth media filters (SF-CMF) and ultra-fine microfiber cloth media filters (UF-CMF).

Utilizing Cloth Media

The treatment train employed in the pilot study consisted of raw sewage coarse screening (¼-in. openings) and grit removal, followed by parallel operation of both the CMF and existing primary clarifiers. The initial testing was conducted with SF-CMF virtually uninterrupted for 30 days. Subsequently, UF-CMF was tested in lieu of SF-CMF under similar operational conditions. During the testing period, the common influent of the CMF and the primary clarifier system exhibited total suspended solids (TSS) ranging from 104 to 526 mg/L, with an average concentration of 236 mg/L. While efficiently designed and operated primary sedimentation systems are expected to remove approximately 65% of TSS, the average removals demonstrated in the study revealed nearly 80% and 90% for SF-CMF and UF-CMF, respectively. Additionally, the SF-CMF media demonstrated nearly 54% biochemical oxygen demand (BOD5) removal, while the existing primary clarifiers attained 44% removal. By comparison, the UF-CMF media exhibited the best performance with an overall 64% BOD5 removal efficiency.

These findings suggest that the use of CMF may reduce the energy needed to oxidize carbonaceous material in the downstream activated sludge system by 30% to 45% over conventional primary sedimentation. Significant reductions in organics, as measured by BOD5 values, also indicate the potential for CMF to emerge as a valid technology to potentially improve gas production (energy harvesting) in the anaerobic digestion system. Lastly, the high solids-loading capacity of about 10 lb TSS per sq ft per day, attained for both cloth media in this study, suggest that CMF is able to take less than 10% of the footprint of conventional primary settling basins while still providing better quality effluent.

Rock River Results

Overall, the test supports the application of AquaDisk technology in conjunction with OptiFiber cloth filtration media to effectively filter screened, degritted raw municipal sewage. Both cloth media demonstrated a capacity to handle significantly higher solids-loading rates than typically used on secondary clarified effluent (by a factor of three to five times). The range of influent TSS observed (104 to 526 mg/L) and average sustained concentration (236 mg/L) suggests that cloth media filtration is applicable for both combined sewer overflow treatment, as well as primary treatment in lieu of conventional sedimentation systems. The system is able to produce consistent, high-quality effluent performance throughout the variable influent conditions. Significant reductions in organics, as measured by BOD5 and chemical oxygen demand values, indicate the potential for CMF to emerge as a valid technology to reduce energy demands in the downstream aeration basins and potentially improve gas production (energy recovery) in the anaerobic digestion system. w&wd