

Energy Savings and Improved Mixing Performance of High Consistency Cellulose with Modified Impeller Technology

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Abstract

Mixing of biosolids for generation of renewable energy is more challenging than mixing of paper pulp. This is due to the difficult rheology, large volumes of vessels, requirement for high fiber consistency and the need for energy conservation. Biosolids consist mostly of fibrous materials similar to paper pulp where the main component is cellulose. Recently tested in numerous paper mills, this full scale proven technology can be applied to biosolids mixing. At present, most cellulosic/paper pulp vessels are only partially mixed with side-entry mixers. Maximum consistency is restricted to less than 6.5% due to mixing limitations. Manufacturers also use recirculation loops to reduce the magnitude of consistency fluctuations in paper pulp production. This new impeller technology allows mixing of the entire vessel, significantly reduces fluctuations of pulp consistency and requires 50% less power than conventional side entry mixers. The ability to uniformly mix biosolids throughout the entire vessel maximizes exposure of fibers to chemical/enzymatic treatments and provides high treatment efficiency at low mixing power. This technology also allows for uniform mixing of cellulosic pulp up to 20% consistency. The paper describes the provincials of the new technology, case studies, measurement of mixing performances by Electrical Conductive Tomography and the method of measurement of biosolids properties.