

Clarification and Dewatering Control Industrial TSS

The New Energy Corporation facility in South Bend IN produces 380,000 M³ per year (100 million gallons per year) of ethanol from corn feedstock. It also produces about 272,000 tonnes per year (300,000 tons per year) of carbon dioxide and 299,000 tonnes per year (330,000 tons per year) of distillers' dried grains with solubles (DDGS) as saleable byproducts.

The facility's production processes include corn hammermills, mash tanks, batch fermenters, distillation, thin stillage evaporation, and DDGS dryers. Its waste streams come from fermentation tank cleaning, the DDGS dryer scrubber, cooling tower blowdown, process water tank overflow, and sanitary waste. Altogether, facility effluent makes up about 2% of the South Bend wastewater treatment facility's average flow. Effluent solids, pH, temperature, settleability, and instantaneous flow can vary widely, particularly during clean-in-place (CIP) activity, but its total suspended solids (TSS) levels were especially problematic for South Bend's combined sewer overflows (CSOs).

So, New Energy Corporation needed a cost-effective pretreatment process. After evaluating clarification, filtration, biological treatment, source segregation, and solids recovery, the project team decided to process the combined wastewater streams using a K-S 600 ft² (56 M²) dissolved air flotation (DAF) wastewater clarifier from Komline-Sanderson Engineering Corporation (Peapack NJ). The team also decided to use a K-S 2-M Kompress® belt filter press to dewater solids before landfilling.

The DAF clarifier dissolves air, blends it with water under pressure, and then releases the mixture into the tank under atmospheric pressure, thereby creating micron-sized bubbles that attach to suspended solids in wastewater, greatly accelerating the separation rate and efficiency. It works well in situations with limited space and wastewater containing less than 10,000 mg/L solids.

The separated solids (5% to 10% solids) then are sent to an agitated 195 M³ (50,000 gallon) tank before being dewatered by the belt filter press. The press uses gravity and gradually increasing pressure to produce a dewatered cake containing up to 30% solids.

The project team designed the system so pre-screening, additional chemical pretreatment, and pH control can be added later. The entire system, from lift station pump to dewatered solids conveyor, is automatically controlled via a programmable logic controller (PLC) and an Allen-Bradley touch-screen terminal.

The pretreatment system was placed in operation in July 2004. It removes up to 85% of effluent solids before sewer discharge and produces solids acceptable for landfilling.

