

SPRINGBORO

Polymer Activation Equipment Upgrade Yields Consistent Polymer Savings of Over 13% for Wastewater Plant Operator

OVERVIEW

Springboro, Ohio is a suburb located between the cities of Cincinnati and Dayton. Springboro is part of the greater Cincinnati-Dayton Metroplex, the 14th largest urban area in the United States. The nearby city of Dayton was an industrial powerhouse during the mid-twentieth century and home to major companies such as Proctor and Gamble, Champion Paper and Fiber and National Cash Register. As changes in the economy have caused the decline of the manufacturing centers in the cities, suburbs such as Springboro, have grown. Today, Springboro is home to just over 18,000 residents.

The operations, maintenance, and management of the city's water and wastewater facilities are handled by one of the largest water and wastewater contract operators in the world. The operations contractor also manages plant effluent reuse and disposal of the biosolids. Springboro's wastewater treatment facilities include a 4MGD sequencing batch reactor plant, a collection system of over 90 miles and nine wastewater pump stations. The wastewater treatment plant processes 40,000 to 50,000 gallons of sludge four to five days per week.

In an effort to lower operational costs and extend the life of the dewatering centrifuge, operators began to look at the polymer activation equipment in use at the plant. The Polyblend® M-Series emulsion polymer activation systems had been in steady operation for over 10 years. The equipment still performed reliably, but operators were interested in ways to achieve greater efficiency. They were aware of the new Polyblend® Magnum mix chamber, with its enhanced two-zone mixing energy.

The Magnum mix chamber was designed to achieve higher viscosity polymer solutions by following the science of polymer activation. In general, higher solution viscosities correlate with higher degrees of activation and greater charge site exposure. Simply stated, equipment that delivers higher polymer solution viscosities can help dewatering equipment operate more efficiently. The Magnum mix chamber



features two stage mixing: high-energy mixing at the moment of initial wetting (MOIW) followed by low energy mixing and increased polymer residence time. The engineered volume of the Magnum's low energy mix zone accelerates the hydration and relaxation of the activated polymer chains resulting in increased viscosity and dewatering performance.

When evaluating potential savings from an equipment upgrade, Cleanwater₁ polymer experts consider the emulsion polymer's characteristics. The polymer used at the Springboro plant was not familiar to the Cleanwater₁ team, so a 100 ml sample of polymer was collected and sent to Cleanwater₁'s Vineland, New Jersey facility for testing. The polymer sample was "made down" to a series of polymer solutions and the resulting solution viscosities were tested. The results of the polymer viscosity tests indicated the polymer was of sufficiently high molecular weight to expect significant improvements in polymer yield by employing the Magnum mix chamber.

With the results of the viscosity tests in hand, the operators were presented with two options. Since the Magnum mix chamber is available as either a retrofit for the standard Polyblend® M-Series emulsion polymer activation units, or as an option on completely new MM-Series units, the operators could replace the entire polymer feed system with a new piece of equipment or they could install the Polyblend® Magnum upgraded mix chamber to the existing equipment.

The operators chose to retrofit to their existing equipment and were able to install the Polyblend® Magnum chamber themselves in less than two hours, which meant minimal down-time for their process equipment.



Polyblend® M-Series

Polyblend® Magnum M-Series

After operating for several months, they compared their monthly polymer use before and after the installation of the Magnum chamber and confirmed a reduction in polymer use of over 13% on similar sludge and cake solids. Overall, they were pleased with the quick return on investment on their equipment upgrade, especially since there was minimal down-time for their operations.

"The Magnum chamber retrofit was straight forward and has operated reliably since installation. We're seeing a reduction in polymer use and our investment was paid back in about 12 months".

Terry Smith, Springboro WWTP Supervisor

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