

Glycol Purification System for Polyester Resin Plant

Challenge

A polyethylene terephthalate (PET) resin manufacturing process was generating large volumes of spent ethylene glycol (EG) that was distilled before recycling. The plant produces polyester resins used in a variety of products, including fiber, film, and engineering polymers.

Prior to contacting our Memphis Service Center, the distillation process was generating a secondary waste stream that contained, among other things, the heavy metal antimony. (Antimony functions as a catalyst in the production of PET.) Unfortunately, this "traditional" process yielded less than desired EG quality for recycle and generated significant "still bottoms" for disposal. The "still bottoms" stream contained expensive catalyst and PET monomer. Disposal meant significant environmental impact and cost as the bottoms were shipped off-site for incineration. As part of its environmental stewardship program, the client wanted to improve the quality of these "EG bottoms" while eliminating them altogether as a waste.

When they learned that our Memphis team had developed a patented process using a combination of continuous crossflow microfiltration and selective ion exchange technologies to revamp the spent ethylene glycol recovery process, it immediately began the approval process for implementing the technology.

Solution

When the system first arrived, it operated out of a trailer parked near the distillation columns. Within a few years, however, it had been moved into a permanent building designed and built for the purpose and augmented, when necessary, with trailer-mounted equipment.

Spent EG feeds directly into this building from storage tanks supplied by production areas throughout the plant. After working its way through specialized filtration equipment, the glycol then enters two banks of vessels containing the variously charged ion exchange resins.



This process goes on pretty much nonstop, twenty-four hours a day, seven days a week. Yet it all works so smoothly with our operator stopping by only a few hours each morning to check the system, take notes and record data.

Results

The benefit to the customer were significant. Not only was the expensive catalyst removed from the waste stream, but the quality of the EG recycle stream improved dramatically, which improved the overall PET resin

process. Importantly, the bottoms stream was eliminated - zero discharge, no off-site shipments, and no incineration. The cost savings equate to millions of dollars per year, which go straight to the bottom line

Second, by purifying the spent EG before distillation, the company was able to produce a higher quality "bottoms" product that could then be marketed for use in unsaturated polyester resins called polyol.

Third, by recovering and reprocessing the antimony, the client avoids the full cost of buying new catalyst and disposing of the old. It also keeps antimony out of the waste stream and reduces the environment impacts of further mining, smelting and transportation. The antimony is reprocessed at our Memphis facility and then sent to an antimony smelter where the customer can receive credit on the purchase of new catalyst.

The client did share that in the first 6 years of operation, the company has eliminated a million pounds of waste annually, much of it in the form of reusable glycol and catalyst.