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CASE STUDY

Marglen Industries Uses Four Eriez® Eddy Current Separators to Remove Virtually all Aluminum from PET Flake

Nestled among 57 acres in Floyd County, Georgia resides the processing facility for Marglen Industries, a manufacturer of fibers used in carpet, fiber fill, needle punch non-wovens and other textile products. One striking difference that makes the company stand out from its competitors is that Marglen uses 100 percent post-consumer PET flake taken mostly from recycled beverage bottles.

Marglen Industries began in 1971 as a carpet manufacturer, but in 1991 the company began producing polyester fiber after purchasing the recycled PET flake from an outside merchant. In 1997, Marglen added a bottle washing and grinding plant which today encompasses approximately 50,000 square feet and gives Marglen 90 million pounds of annual PET recycling capacity.

Because of customer demand for its polyester fiber, Marglen still purchases some recycled flake from outside vendors to complement its in-house bottle processing operation. All PET flake that finally makes its way to Marglen's Fiber Extrusion operation is put through a rigorous cleansing and decontamination system designed to ensure virtually 100 percent clean flake, according to Jim Roberts, Marglen Plant Manager.

Besides using an array of bottle washing equipment, granulators, extruders and screens, Marglen, since 1994, has relied on Eriez® REA Eddy Current Separators (ECS) to effectively remove aluminum contaminants from the PET flake. Marglen now has three, 48" ECS machines and recently added a 60" ECS unit during its \$6 million plant expansion late in 2009, according to Roberts.

"The Eddy Current Separators are an integral part of our PET flake processing system; you need this kind of equipment to purify the flake," Roberts says. "Whether we make it through our own bottle processing plant or buy it from the outside, 100 percent of the flake we have is run through either the 48" or 60" ECS. This is the final step before the flake goes through quality control testing and then into our silos."

"Removing aluminum from the product is very important because it eliminates problems in the downstream extrusion process," Roberts observes. "Too much aluminum creates excessive screen changes at our extruders and that causes runability issues. Our quality control lab checks for contamination and finds acceptable levels of aluminum after the flake is run through the Eriez ECS machines."

Converting Dirty Bottles to Clean PET Flake

Marglen purchases baled bottles from MRF's and Recycling centers throughout the United States. The bottles are washed in a chemical solution which removes the labels and glue. The clean bottles are then transported via conveyors to automatic sorting equipment and separated by color and type. The bottles are manually processed one final time to ensure that they have been sorted correctly.

The sorted bottles are then conveyed to granulators and ground into 3/8" raw flake. An additional process removes any lingering paper, labels, closures and tabs, leaving just the PET flake containing fine aluminum particles. The PET flake is fed by conveyor through either the 48" or 60" ECS. Through the induction of eddy currents and the resulting repelling forces, the magnetic field repels the nonferrous aluminum and physically separates it from the plastic regrind, minimizing PET flake loss compared to other sorting technologies.

When the polarity of the magnetic field around the aluminum is the same as the rotating magnets, the aluminum is repelled from the magnet. This causes the trajectory of the nonferrous metal to be different than the PET flake. The two streams of material are separated by an adjustable splitter in a simple, high-volume and effective manner.

The Eddy Current Separators have helped Marglen obtain a single pass aluminum reduction up to 92 percent and achieve a clean PET yield of 97 to 99 percent. "We're fortunate because we are getting most our flake with an aluminum content of zero to 50 parts per million after it comes through the ECS," Roberts notes.

Inner Workings of Eddy Current Separators

The Eddy Current rotor is the heart of the separator. Eriez offers four different rotor designs with the Rare Earth Arched (REA) being the main rotor for removing aluminum contaminants from PET flake at Marglen Industries.

The REA rotor uses powerful Rare Earth magnets curved to fit the shell contour. The high-frequency rotor and unique polarity offer exceptional removal of small and medium nonferrous

metals from not only PET flake, but glass cullet, electronic scrap, foundry sand and urban wood waste.

Eriez' latest Eddy Current Separators also feature a new high-speed bearing design which creates 25 percent higher rotor speed for added PET flake purity. The bearings can last up to 15 years with proper maintenance.

Other enhancements to today's Eddy Current Separator include a special PET flake splitter which provides higher PET purity and yield. This splitter is adjustable in both angle and height to accommodate a range of belt speeds and particle sizes.

Yet another new feature is a thin, abrasion-resistant urethane conveyor belt that maximizes the aluminum "pop" in the eddy current field. PET flake in-feed process rates up to 2,500 lbs/hr/ft of feeder width can now be achieved for maximum throughput.

Eddy Current Separators are normally outfitted with a vibratory feeder and hopper to give an even, controlled flake depth for better separation performance. For high aluminum content feedstocks, a Rare Earth Roll Magnetic Separator can be attached which removes 40 to 60 percent of the aluminum before the PET flake even enters the ECS.

60-inch ECS Offers Superior Performance

"We've always used the 48" ECS machines in the bottle processing plant, but we've never had one as large as the 60" unit that was installed late in 2009," says Roberts. "The larger unit allows for a good lay down of material on the belt which helps the flake settle before reaching the rotor area."

Dana Pellerin, Maintenance Manager and Plant Engineer for Marglen, has purchased Eriez equipment for 20 years and sees significant changes in the newer model ECS units. "Eriez has definitely committed to more research and development on the new machines. They have changed the whole bearing set-up on the rotor, which has made it more durable."

"Our Eriez ECS machines run 24/7," Pellerin says. "When you have a rotor running continuously at high speed, it's taxing on the bearings. Eriez put some extra time into designing a completely sealed bearing to make it better for the customer. Now we can run our machines with practically no downtime issues."

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Eriez is recognized as world authority in advanced technology for magnetic, vibratory and inspection applications. The company's magnetic separation, metal detection, x-ray, materials feeding, screening, conveying and controlling equipment have application in the process, plastics, metalworking, packaging, recycling, mining, aggregate and textile industries. Eriez manufactures and markets these products through 12 international facilities located on six continents. For more information, call toll-free (888) 300-ERIEZ (3743) within the U.S. and Canada. For online users, visit www.eriez.com or send e-mail to eriez@eriez.com. Eriez World Headquarters is located at 2200 Asbury Road, Erie, PA 16506.