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Ensuring Product Purity in Plastic Recycling

by Don Suderman - Product Manager, Material Handling

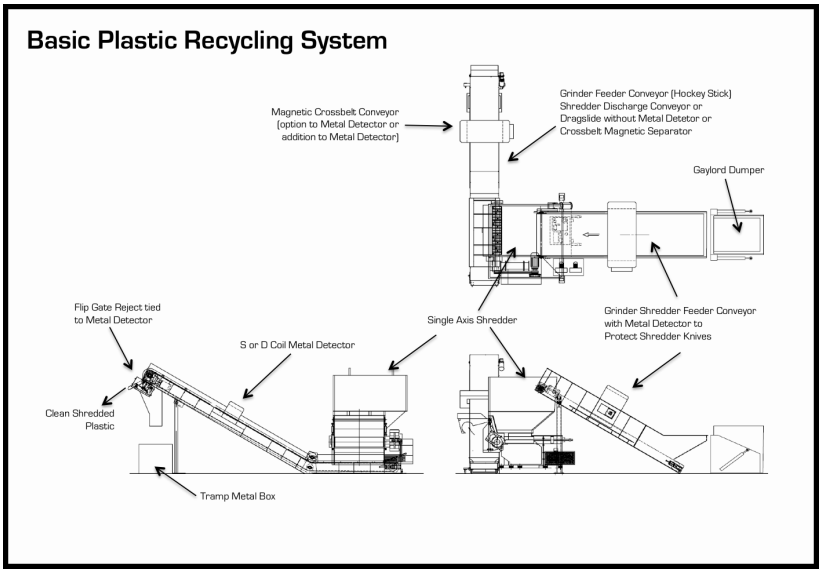
Ensuring Product Purity in Plastic Recycling

Product purity is the most important factor in plastic recycling. Whether processing is being done for in-house production, or regrind is being prepared for resale, a major factor in achieving product purity is eliminating metal contamination. Removing metal from recycled plastic cannot be done with a single piece of equipment, but requires a series of components engineered as a complete system. While a plastic recycling system can take any number of configurations, here are two typical plant layouts showing how metal contaminants can be eliminated.

A Simple Plastic Recycling System

The diagram on the next page shows a basic plastic recycling system for shredding postconsumer plastic.

Product purity in a basic system such as this begins where postconsumer plastic is fed into shredders or grinders. This calls for a tunnel-style metal detector on the infeed conveyor for equipment protection, since postconsumer plastic



contaminated with metal can damage shredder and grinder knives.

Capturing metal at this point can eliminate expensive repairs and nonproductive downtime. It is far more productive to remove larger contaminants before shredding than to detect and remove hundreds of miniscule pieces of metal that have been shredded. The infeed conveyor tunnel-style (sometimes called loop-style) metal detector should be as short as possible to maximize detection sensitivity, yet as tall as necessary to handle the flow size and volume of the raw material input. Clearly, no standard off-the-shelf

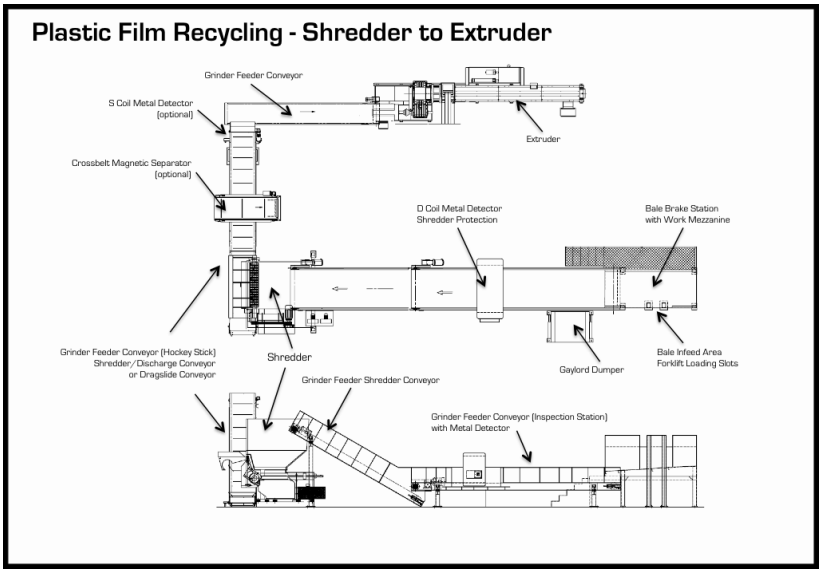
metal detector is appropriate in such situations. It is important for plastic recyclers to work with a full-line metal detector supplier that can address any of the myriad applications scenarios possible.

The second essential step toward product purity involves magnetic and/or metal detection equipment on the shredder discharge conveyor. Shredded plastic should be further cleaned before being moved to a secondary grinder/granulator, a Gaylord box, or extruder. A plate-style metal detector on the inclined section of the discharge conveyor will sense all forms of metal contamination. A conveyor flip gate can separate contaminant from shredded material. In certain installations, the metal detector should be combined with an overhead magnetic crossbelt conveyor, to minimize metal detector rejections by removing most ferrous metal contamination ahead of the metal detector. This added magnetic protection reduces the amount of discharged plastic with the metal contamination. Running this discharge conveyor faster than normal lowers the product burden on the belt, improving magnetic ferrous removal and reducing product rejected by the metal detector.

Installing additional equipment further downstream to remove smaller metal pieces and ensure even purer product can improve quality still further. These devices include smaller aperture gravity metal detectors, machine-mount metal detectors, and magnetic drawer filters.

Plastic Film Recycling to an Extruder

Recycling setups of this sort are shown in the diagram below:



Recycling systems of this type call for a metal detection inspection conveyor to examine

postconsumer material immediately after the bale break station or Gaylord dump location. For equipment protection, an appropriately specified grinder feeder conveyor should be equipped with metal detection capability for incoming inspection. After this initial inspection, incoming plastic is routed to the shredder.

On the output of the shredder, a magnetic crossbelt conveyor is recommended to separate any metal not detected on the input side of the shredder. This removes any ferrous material that has been shredded.

Finally (and depending on the ultimate use of the extruded plastic), another metal detector is often useful. Because metal detectors can sense the presence of nonmagnetic material that may pass under the crossbelt conveyor, a downstream metal detector serves as a final check before material enters the extruder.

Summary

Product purification in plastic recyclers is a continual process. With key metal detection and magnetic separation equipment in place and with

conveyors carefully selected to complement that equipment, plastics recyclers can achieve higher throughput, greater productivity, and cleaner regrind. Still, any recycler should put a rigorous program in place to routinely inspect and maintain metal detection and magnetic separation equipment to ensure that captured metal is disposed of properly. Vendors of metal detection equipment can recommend testing procedures to ensure that installed equipment is performing properly.

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Bunting Magnetics Co. is a full-line supplier of metal detection and magnetic separation equipment, as well as specialized conveyors for use in recycling plants. When equipping a plastics recycling plant, conveyors and inspection equipment should be sized in relationship to each other. Assembling components from different manufacturers often leads to unmatched installations, often with dramatically reduced efficiency and inspection capability.

Don Suderman

Don Suderman is Product Manager for Material Handling Equipment at Bunting Magnetics Co. He has undergraduate and graduate degrees in engineering from Kansas State University and for more than 30 years has held design engineering, technical service, and product management positions at Bunting. He holds five patents, three of which pertain to magnetic devices.

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