

Maximizing Separation Magnets in Powder and Bulk Processing Applications



LOCATION. LOCATION. LOCATION.

No, this is not an article extolling the golden rule to real estate success, but the familiar mantra is applicable to powder and bulk processing applications. Specifically, it is critical to choices made with respect to the selection, placement and installation of magnetic separation equipment.

The golden rule for magnetic separation: a single magnet in a given location can do one of three things- but it cannot do all three. It's very much like akin to the “fast-good-cheap” conundrum wherein you can have two but not all three. What follows are three common locations and scenarios where magnets are best applied.

APPLICATIONS

Incoming inspection:

A magnet placed at a location to check for ferrous contamination on inbound raw and related materials (think bulk receiving dock) from the upstream supply chain works to prevent metal from entering into the processing line. This is an optimal location to monitor the quality of inbound goods, run batch checks and generally ensure that what is being introduced to the plant is as clean as possible.

Capital equipment protection:

Magnets are ideal to ensure operational efficiency and protect capital equipment by virtue of keeping the process flow clean and humming along. Minimizing downtime to repair or replace capex investments, filter bags, screens and sifters due to metal damage equates to higher throughput and profitability.

Consumer protection:

Magnets placed at end-of-line packaging/bulk load-out locations provide a “final inspection” to ensure that no contaminants- be it fines or large tramp iron like a nut or bolt- leave the processing plant where their discovery in a finished, consumable product could and has been known to have catastrophic results.

Each of these locations act as control points, whereby the entry point of metal contamination can clearly be narrowed down and pinpointed since there are multiple magnets in use. This makes discovery faster and return-to-production time quicker and more efficient.

Myth buster: metal contamination does not always come from the upstream supply chain. Capex and processing equipment itself is often the culprit which necessitates the use of magnets to capture metal fragments from screen material, fasteners, abrading and contact-friction surfaces which create metal fines- among other offenders.

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RULE OF THUMB

On a related note, a general rule of thumb on magnet material selection says if you're trying to capture large metal objects such as nuts, bolts, screwdrivers or bailing wire then a Ceramic circuit is sufficient. If the goal is to capture metal fines, weakly magnetic wire and similar contaminants, then Rare Earth would be the material of choice. There are other magnetic materials such as Alnico and Samarium Cobalt for high temperature applications. So which option do you choose? It depends; it also depends on the location and accessibility for cleaning the magnetic separator. Do you want to push a button and it self-cleans? Do you prefer to accomplish that with the use of air, hydraulics or electricity? Options are plentiful.

THE VALUE PROPOSITION

Magnets are commonly tagged as "auxiliary equipment" and that's a relatively accurate moniker; the purpose of the equipment is to help and support other equipment. What makes magnets attractive is that they have an extremely low cost to operate versus a significant cost of failure. Should a plant choose to bypass the selection and installation of magnetic separation equipment and subsequently experience a metal contamination incident it can be financially crippling, notwithstanding the punitive and intangible damage to the brand. Generally, a single magnetic separator may contribute 1-2% of a manufacturing line's equipment cost and even less as a percentage to clean and operate. So if said separator has a price tag of \$20,000 it certainly represents a prudent option which deserves consideration...consideration which I believe in the end would win out over crossing one's fingers and hoping not to roll snake eyes in terms of metal contamination.

Yes, it's like peeling back the onion. But it is worth the time and energy on the part of the plant and the equipment manufacturer to investigate options and create a plan for success. An objective approach to magnet selection and placement is worth the cost-free investment.

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