sesotec

White Paper

Keeping metallic contaminants out of plastic compounds

Content

A resource for plastic granulate and compound manufacturers

A certain degree of machinery wear and tear is simply part of doing business in plastics compounding and masterbatch production. On a semi-regular basis, machines must be replaced, parts exchanged, and systems retrofitted. While some machine downtime is unavoidable, materials harboring metallic contaminants could be leading to excessive stops, costly repairs, and compromised quality.

This Whitepaper takes a look at the challenges that metal contaminants pose to compounding and masterbatch manufacturing and explores the unique specifications that metal separators must have in order to provide an adequate solution.

Common sources of metal contamination in compounding and masterbatch production

Before they become finished plastic products, raw materials must undergo many treatments during which they are exposed to potential sources of metal contamination. Among the most common sources of metal contamination in plastics production are machinery wear and tear, chipped tools, equipment breakage, loose screws, improper storage, and even personal items from staff.

Plastics compounders, granulate producers, and masterbatch producers are in a particularly vulnerable position when it comes to metal contaminants entering their product flow. This is because of the sheer number of material components they work with on the one hand, and the mechanical nature of compounding on the other. Materials may arrive at compounding facilities already harboring metallic contaminants, or the product flow may become contaminated as production equipment degrades.

Granulate and compound producers who work with recycled resins face an even greater risk of metal contamination. The reasons for this are two-fold:

Firstly, recycling processes that remove improperly disposed of materials from recycling streams are not always reliable, leading metallic particles to sometimes end up in fractions of recycled plastic.

Secondly, post-consumer plastics must undergo additional mechanical processing steps in order to be repurposed, thus increasing the likelihood that recycled resins become exposed to contaminants at some point in their production.

The problem with metal contaminants

Metal contamination in plastic granulate is one of the most frequent causes of unplanned downtimes, machine damage and quality problems- both for granulate manufacturers themselves, but especially for their customers‘ downstream production processes.

Once metal contaminants have entered into the product flow, they can trigger a vicious cycle of machine damage, process interference, and further contamination.

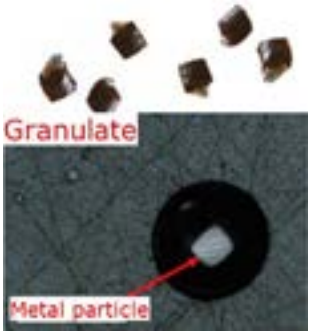
Metal contaminants can build up or become lodged in screen changers, melt filters, nozzle tools, and non-return valves, causing blockages or combustions that halt production or lead to minor quality. During mechanical processes such as plasticizing, metal particles can lead to premature wear and tear or damages, causing maintenance costs to rise.

Extruder screen without use of a metal detector

Broken plasticising screw

Not only can metallic particles cause damage to machinery, but this damage can itself become a source of metal contamination. Spalling, chipping, scratching, and other surface irregularities caused by metal particles may in turn give rise to additional contamination and further costly repairs.

Blockage-induced plastic leakage from an injection-moulding tool



Metal inclusion in granulate

Such a scenario can set off quality assurance issues, resulting in metal particles making their way into finished plastic products. Metal inclusions in compounds and granulates undermine product quality and can render certain plastic products unusable, thus leading to customer complaints. The cost for a product recall due to metal contamination can easily amount for (or even exceed) €10,000 – 20,000 in coordination, PR, and customer relationship expenses.

Preventing and addressing metallic contaminants

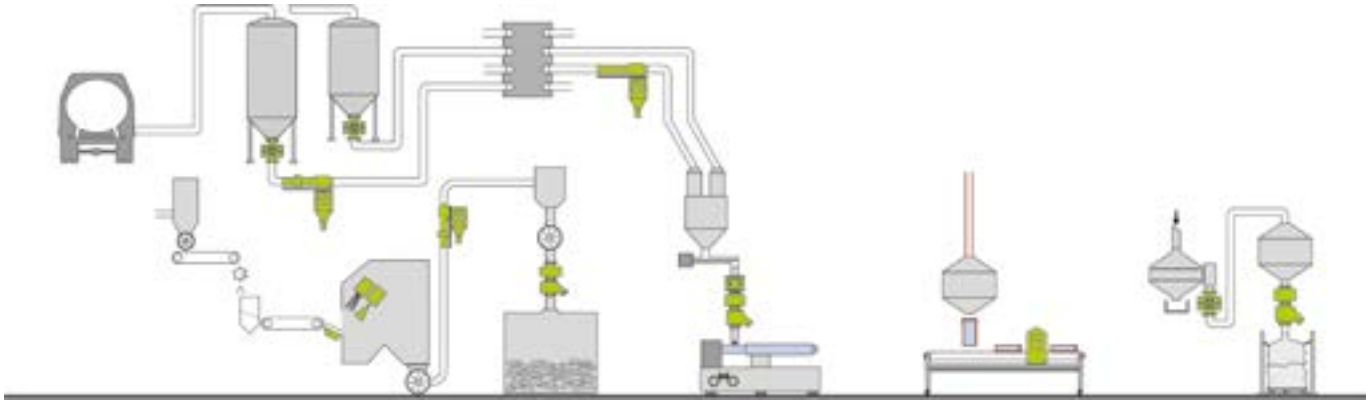
There is no singular source of metal contamination in plastic compounding or masterbatch production. For this reason, it is important that compounding facilities take a holistic approach to preventing contaminants from entering the product flow and addressing issues of contamination as they arise.

- **Educate staff** – All employees who work with compounding machinery should understand the cause and effect relationship between metal particles, machine downtime, customer complaints, and unscheduled repairs and maintenance. This knowledge can empower staff to take proactive measures to protect machinery and maintain process reliability.

- **Inspect incoming goods** – Early detection of metal contaminants can prevent a great deal of unneeded frustration and damage. This is especially important when working with a wide variety of materials from different sources, as compounders and masterbatch producers often do. Metal detection systems at raw material intake are well suited for this task.

- **Cautious and diligent maintenance** – A robust preventative maintenance program can help keep machine damage from escalating. But it is essential that all work done to processing equipment is performed with care to ensure that no metal particles, such as metal filings or loose bolts, remain within the machinery after maintenance.

- **Metal separators at key processing junctures** – Installing metal separators at critical points along the production line, such as before bag filling at the end of the extrusion line, can keep metal particles out of processing equipment and end-products.



What compounders need in a metal separator

The installation of metal separators can make a significant and cost-efficient contribution to ensuring product quality and protecting equipment from damage, but not every metal separator is built for the specific needs of plastics compounding and masterbatch production.

In order to effectively address the problems that metal contaminants pose to process efficiency, product quality, and equipment availability, metal separators for plastics compounding should have the following characteristics:

- **Highly accurate detection** – Even miniscule metallic particles can add up to serious machine damage, quality issues, and lost productivity overtime. A state-of-the-art metal separator for plastics compounding should be able to reliably detect and reject smallest particles of ferrous and nonferrous metals. For their superior accuracy, metal separators engineered with high-resolution frequency technology are better suited than magnet systems for use in this industry.

- **Quick cleaning for frequent color and material changes** – Metal contaminants can detract from the quality of plastic compounds, but so can pigment and material residue from product changeovers. Metal separators must offer quick and easy cleaning in order to protect the color and material quality of subsequent batches without unduly stressing process efficiency.

  Design features such as toolless opening and a removeable rejection unit can expedite manual cleaning. Metal separators with integrated washing nozzles can virtually eliminate manual cleaning during changeovers, saving compounders over 120 hours of manual labor each year.

- **Built to withstand wear and tear** – Plastics compounding often involves abrasive materials and high-volume processing conditions that can accelerate machine attrition. Metal separators used in compounding must themselves be designed weather even the most strenuous production environments. To prevent premature wear, sealing gaskets should be completely out of contact with the product and free of silicone. Particularly abrasive products may call for a metal separator made from HV 900 materials.

- **Seamless in-line integration** – An ideal location for a metal separator for quality control in the plastics compounding process is after sieving and just before bag filling in an filling station. Free-fall metal separators are best suited for this position. The installation must be possible in a flexible, easy and space-saving way.

- **Smarter quality assurance and effortless batch tracing** – Intelligent recordkeeping can help plastics compounders win valuable insights into the efficiency of their processes and serve as a documented line of defense against quality issues. Metal separators that are IOT-ready and equipped with intuitive logbook functionality can empower compounders with the data necessary to trace contaminants to their source.

Conclusions

Between constant maintenance, frequent replacements and lost production time, tiny metal particles can lead to excessive product recall costs for companies producing granulate, compounds and masterbatches. In addition to staff awareness and careful maintenance, metal separators play a pivotal role in helping keep metal contaminants out of the product flow.

Plastics manufacturers will see the most gains in terms of quality assurance, process reliability, and economic efficiency with a metal separator that is built with their unique production environments in mind.

Learn more

The newly designed RAPID PRO-SENSE 6 from Sesotec is a metal separator specifically engineered to address the unique combination of challenges found in plastics compounding, masterbatch production, and resin manufacturing. This patent-pending solution marries accuracy, ease-of-use, durability and easy cleaning in order to improve product quality, efficiency, and profitability in granulate production operations.

Request further information about the **RAPID PRO-SENSE 6** from Sesotec.

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Sesotec - an overview

The Sesotec group is one of the leading manufacturers of machines and systems for contaminant detection and material sorting. Product sales primarily focus on the food, plastics, and recycling industries.

www.sesotec.com

Metal detection systems

X-ray inspection systems

Sorting systems

Magnet systems