White Paper

The Most Essential Innovation in Magnetic Separation Since 1860

The Intell-I-Mag® Story

Introduction

Magnetic Products Inc. (MPI) is the first to bring reliable, intelligent automation to industrial magnetic separation since the technology's commercialization began in the 1860s in manufacturing.

Intell-I-Mag®, developed and patented by Magnetic Products, Inc. (MPI), is the industry's first and only sensor-enabled magnetic separator. The most important innovation in magnet separation technology since MPI's self-cleaning magnet debuted over three decades ago; this robust system conveniently tells plant operators and personnel exactly when a magnet needs to be cleaned - and when it does not. The Intell-I-Mag® separation system self-monitors and provides real time performance alerts - eliminating unnecessary maintenance downtime while protecting the product from metal contamination.

This allows operators to optimize their magnet cleaning schedule, reduce downtime, and maintain peak performance of their metal control system.

intell-i-mag®

Exclusively by Magnetic Products, Inc., U.S. Patent 10,543,492.

MAGNETIC PRODUCTS, INC.
Magnets | Material Handling
Electronic Inspection | Service

Solving an Industry-Wide Problem

According to a 2023 study in Science Direct, Food Contaminants and Their Pathways Within Food Processing Facilities, 48% of food and beverage manufacturers' operational risks are due to chemical or physical food contamination pathways.

The National Food Standards Agency, NFS, has long confirmed that metal is the number one physical contaminant cited in incidents globally, causing 32% of all category shutdowns and recalls.

Keeping metal contaminants out of feed and other bulk materials is an ongoing challenge – one that, if not appropriately planned for and prioritized, can cost a company millions of dollars in rejected products and open them up to recall risk and brand reputation damage, not to mention reduce the longevity of processing equipment that is damaged by metal in the product stream.

Most food processing plants have magnetic separators that remove ferrous tramp metal from raw materials at various locations throughout the production process. However, without a reliable method for knowing when these magnets are saturated with metal, plants must temporarily shut down their production lines at set intervals for regular magnet cleanings, whether needed or not. This inefficient practice has led to a gap in lost production time, unnecessary, increased plant operational costs, and damage to brand reputation and consumer confidence.

Intell-I-Mag® empowers a separator with technology that detects the magnet's saturation level and alerts an operator when the magnet reaches a plant-defined saturation level - they know precisely when that magnet needs to be cleaned and, equally as important, when it doesn't.

Proven Benefit and ROI

Before Intell-I-Mag®, there was no way for an operator to know the saturation level of their magnetic separator other than by shutting down the production line to check.

Intell-I-Mag® changes that. One Intell-I-Mag® early-adopter was able to reduce their total number of magnet cleaning shutdowns by more than 2/3rds in the first year of piloting the system, and, as a result, reduced their operational costs and increased their throughput, resulting in additional revenues of $1.5M. That's the power of an intelligent magnet.

In addition to saturation alerts, Intell-I-Mag® automatically collects and logs cleaning history and saturation trends, letting the operator – and QA/QC personnel – know when it was cleaned, when there was a spike in saturation, and what events – for example, deliveries – were the most significant contributors to metal in the product stream. The improved production quality and efficiency won Intell-I-Mag® Best of Show at The International Association of Operative Millers (IAOM) and Best in Supplier Plant Efficiency at the International Baking Industry Exposition (IBIE) in its inaugural year.

Magnetic Products, Inc is leading an evolution in metal control with Intell-I-Mag®'s disruptive technology, offering:

- Improved confidence that the magnetic separator is performing at peak, capturing the most challenging tramp metal in, including work-hardened stainless steel.
- Ensured vendors are not unloading tramp metal into your facility at receiving locations.
- Earlier metal detection, which protects equipment throughout the production line.
- Reduced downtime by only shutting down a line to clean a magnet when needed.
- Increased equipment efficiency and monitoring reduces maintenance costs.
- Prolonged magnetic viability and protection against degradation with the built-in temperature monitoring.
- Optimized labor productivity - employees can perform duties besides checking magnets.
- Confidence that plant operators have cleaned the magnet through the data validation of the Intell-I-Mag® sensors.
- Decreased staff hours required for maintaining magnetic separators.
- Automated QC data collection and improved data quality for internal QA programs, auditors, and customers.
- Elimination of paper cleaning records through automatic data logging.

Flexible Solutions

Intell-I-Mag® is patented technology exclusively available from Magnetic Products, Inc. Magnetic Product Inc.'s intelligent magnet design self-monitors its performance in real time 24/7 to maintain peak performance.

The Intell-I-Mag® Controller monitors tramp metal saturation levels on the working surface of the magnetic separator in real time. The magnetic separator has sensors embedded into the separator that measure the strength of the magnetic field. These sensors report data collected in real time to the Intell-I-Mag® Controller. The controller can be programmed to automatically alert operators to clean the magnetic separator remotely when it reaches industry-designated saturation levels.

Intell-I-Mag® is engineered with versatility and compatibility in mind:

- Intell-I-Mag® is available in drawer, plate, chute, and pneumatic inline plate magnets, as well as magnetic rotary feeders.
- The Intell-I-Mag® Controller monitors within a 25m (80ft.) radius.
- The Intell-I-Mag® system can be rated NEMA 4X for wet applications or where high-pressure washdown is required.
- Suitable for high-temperature applications. Good for operating temperatures up to 105C (221F). With intermittent temperatures < 30 seconds for cleaning up to 125C (257F).
- The permanent magnet will continue to capture tramp metal if the controller is disconnected or not working for any reason.
- Intell-I-Mag® can be added to most compatible models at any time.

Intell-I-Mag® adds value at multiple points in the production process:

Primary magnet installation: improve plant protection from tramp metal, vendor monitoring documentation and accountability, and increase receiving throughput.

Facilities monitor vendor unloading to identify the presence of ferrous metal. The best way to keep metal out of the final product is to keep it from coming into the plant in the first place. The Intell-I-Mag® can be set to the user's specific requirements, enabling the user to help improve product quality and strengthen documentation at receiving locations. If the user has a strict no-metal policy when receiving a product, the Intell-I-Mag® monitors captured metal in real time to ensure the unloading process can be quickly stopped.

At other facilities, the presence of metal may be known, but the user requires it to be removed before the product enters the facility. In this scenario, Intell-I-Mag® can alert the user to stop the unloading process and clean the magnet before the separator reaches full metal saturation.

In either scenario, the user can be confident that tramp metal has not entered the facility from a vendor and maintain improved quality documentation with data collected by Intell-I-Mag®. When metal is absent, the receiving process does not need to be stopped or shut down to check the magnet, increasing throughput.

Secondary magnet installation: reduce maintenance costs and increase uptime.

Intell-I-Mag® can protect downstream processing equipment, such as a hammer mill, airlock, or mixer, from damage caused by metal in the product stream. To ensure proper protection of this equipment, it's essential that the magnet not become overly saturated to the point that it cannot capture more metal.

Intell-I-Mag® empowers operators to set the level of saturation that they want to be alerted to or to have the magnet automatically cleaned. For a magnetic separator to protect processing equipment, the separator should not be more than 50% saturated, still allowing 50% of its power to capture more tramp metal. In this case, the user can set Intell-I-Mag® to notify them when the magnet is 50% saturated, giving them time to shut down the process immediately or schedule an upcoming shutdown to clean the magnet. Preventing this metal event saves the user from unplanned maintenance and repair costs and further downstream damage, including loss of product integrity.

If the magnet does not reach the targeted saturation level, the user may not need to shut down the system to clean the magnet. This information helps users increase the uptime of their processing systems. With multiple Intell-I-Mag® enabled sensors at control points throughout a facility, users can quickly pinpoint processing equipment breaking down and minimize metal contamination to good products.

Finishing magnet installation: improve product quality, documentation details, and consistency, while reducing downtime.

It's essential to document and ensure exceptional final product quality. When a facility has an excellent upstream metal control program, the most significant threat to final product quality can be weakly magnetic work-hardened stainless steel. Using Intell-I-Mag® helps increase the capability of capturing otherwise difficult-to-target tramp metal that is too small for even a metal detector to locate. To do this, the Intell-I-Mag® helps ensure that the magnetic separator always works at peak performance, quickly removing the captured metal from the product stream before it can be "washed off."

To operate Intell-I-Mag® successfully in a configuration like this, the controller is set to a low threshold for saturation, for example, 10%. When the Intell-I-Mag® reaches this saturation level, the user is alerted to clean the magnet. The system can also be integrated to trigger the self-clean cycle remotely when it reaches user-designated saturation levels.

This configuration is ideal to ensure the finishing magnet removes the small and weakly magnetic tramp iron that a metal detector or X-ray machine finds challenging to identify.

Cycling the magnet quickly after capturing ensures the captured metal cannot be washed off into the product flow and end up in the final product. In the event of a metal recall or report of metal in a final product, the user can be confident that the metal does not have ferrous properties or that the contamination is likely from another source outside the facility, such as a rail car or tractor trailer. Adding Intell-I-Mag® data to customers' quality reports provides another layer of confidence that the customers are receiving products without contamination.

Another benefit of using Intell-I-Mag® at the finishing magnet is the packaging or load-out system does not need to shut down for unnecessary magnet cleanings. If Intell-I-Mag® shows that no metal has been captured, the system does not need to be shut down for cleaning, resulting in higher uptime.

Key Features

Real time Monitoring for Peak Magnetic Performance:

- Internal sensors monitor tramp metal saturation levels and alert staff before an incident can occur. Once the magnet reaches the designated level, it notifies plant personnel of the required cleaning when it reaches user-designated saturation levels.
- Oversee vendors during material unloading, resulting in earlier metal detection and reduced damage to the production process.
- Avoid challenges caused by equipment failures, inadequate magnet cleaning intervals, or inaccessible equipment.

Saturation Level Indicators:

- As captured metal increases and magnetic performance decreases, LED indicators signal separator saturation. Parameters are configurable to customer specifications. Default settings are:
  - Green – separator is operating at peak performance.
  - Yellow – separator is near 50% saturation.
  - Red – separator is 100% saturated, cannot retain additional tramp metal, and needs cleaning immediately.
- Alert limits can be set by designated personnel and password protected.

Temperature Monitoring:

- Eliminate one of the leading causes of magnetic separator degradation through real time and peak temperature data reporting.

Detailed Reporting for Quality Compliance Initiatives:

- Data collection improves analysis of magnetic separator performance, including magnet saturation, cleaning alerts, temperature monitoring, cleaning cycles, and position location.
- Operators establish a higher level of metal control and create a stronger quality management plan for programs such as HACCP, ISO, BRC, IFS, and SQF.

Industry 4.0 Ready – Magnet Metrics Controller:

- The industry 4.0-compliant PLC controller allows communication between the controller and integration with factory PLC's or control systems for remote magnet monitoring and control.

Built for the Harshest Environments:

- Controllers are rated for appropriate installation environments, including liquid tight for washdown applications.

Simple UX and UI:

- The setup screen allows you to name the magnet(s) and manage accounts and privileges.
- The home screen offers a quick view of all Intell-I-Mag® magnets and easy access to detailed reporting under the cycle data tab.
- Bluetooth enabled.
- App-run, Apple and Android compatible.

Industry Legacy

Magnetic Products Inc. (MPI) has revolutionized the industry for 43 years with its unwavering commitment to R&D and the core value of high-performance engineering by introducing the world's first quick-clean permanent magnetic separators with the self-cleaning chute magnet in 1983 all the way to the development of the Intell-I-Mag® system and the launch of comprehensive metal control audits conducted by MPI trained expert.

Magnetic Products, Inc. (MPI) is a Michigan-based manufacturer focused on developing cutting-edge magnetic separation and material handling equipment for food and bulk material processors, metal forming companies, and related industries.

Combining advanced manufacturing with over 40 years of industry experience, the company is pioneering new sensor-enabled product lines to complement its proprietary shakers and conveyor systems. In addition, MPI conducts audits on metal control systems and sets the industry standard for magnetic performance.

The MPI Story

Processors that choose to buy from MPI are not just buying a magnet; by choosing an MPI magnet, they're choosing a partner in efficiency, consistency, and productivity.

More than 40 years ago, MPI's founder realized that when he took the time to explain magnetic technology, customers were delighted, and they obtained the results they were looking for. His vision was to start a company where employees and customers were treated exceptionally well, and innovation was the new normal.

Thus, MPI was born and is still under the same family ownership and unique values – treat people right, consistently develop high-quality and innovative products, and lead the industry in customer education. MPI continuously invests in improving customer businesses by developing new products designed to make a real difference. Through the years, MPI has invented and patented innovative products, including Intell-I-Mag® enabled and quick-clean/self-clean magnets and electric low-frequency shaker systems.

MPI truly believes that it must educate its current and future customers on magnetic technology. The organization's leadership says that "an educated customer is an MPI customer." They present the principles of magnetic separation for MPI customers, industry groups, and OEM manufacturers. The presentation qualifies as a course for Continuing Education Credits for Professional Engineers. In addition, MPI's comprehensive, one-of-a-kind "MPI Magnet Audit" has given over a thousand companies valuable insights to help improve their metal control processes.

Not only are MPI products the best in the industry, but the company also makes it easy to do business with them. With over 300 years of collective industry experience, MPI's proven process ensures customers get the right product—every time. Delivering exceptional customer service, MPI's experienced representatives and Regional Managers from around the world come directly to each potential facility to better understand every processing plant and team's unique magnetic separation needs.

Resources

- https://www.ncbi.nlm.nih.gov/pmc/articles/PMC10528236/
- https://www.sciencedirect.com/science/article/pii/S0362028X23068680
- https://www.newfoodmagazine.com/article/13789/for-eign-body-contamination-and-the-implications-for-the-food-manufacturing-sector/
- https://www.powderbulksolids.com/screening-separa-tion/how-rice-mill-reduced-downtime-with-intelligent-magnets
- https://www.feedstrategy.com/animal-feed-additives-ingredi-ents/feed-additives/article/15443155/40-new-feed-additive-equipment-products-released-in-2022

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