MATERIAL CONTROL SOLUTIONS

Eliminating Contamination Risks in Dilute-Phase Pneumatic Processing Lines During Transloading

Client

The client is a bulk material trans-loading operation that uses railcars for temporary product storage and transfers materials into pneumatic trailers for delivery to end users. Operating in outdoor environments with muddy track-side conditions and limited space, the customer required a contamination control solution that could be deployed at multiple locations—including rail siding service areas and receiving silos.

Their primary concern was preventing ferrous metal contamination from railcars entering downstream transport trucks and, ultimately, their customers' facilities. A secondary use case involved verifying inbound ingredients entering the plant were free of metal contamination before processing.

Objective

The customer's objectives were clear and uncompromising:

- Detect and capture ferrous metal contaminants between railcars and pneumatic trailers
- Eliminate product contamination risks introduced during transloading
- Prevent leaks and seal failures common in dilute-phase pneumatic conveying systems
- Ensure portability for manual movement along muddy rail tracks and repositioning at receiving silos
- Maintain continuous product flow without pressure loss or velocity spikes
- Avoid repeated seal failures caused by over-compression and poor clamp design

Ultimately, the client needed a robust, mobile, and sanitary metal control solution that could perform reliably in harsh, real-world operating conditions.

Challenge: Design Flaws in Competitive Systems

The client previously evaluated a competing design that relied on T-handle clamps for sealing. While common in some applications, this design introduced significant performance and safety issues:

- Over-crushing of gaskets, leading to premature failure
- Deformation of the housing's steel plate, permanently damaging sealing surfaces
- Distortion along the housing edge, making airtight sealing impossible
- Product leakage and increased risk of external contamination
- Frequent downtime due to gasket replacement and rework

In dilute-phase pneumatic processing lines, even minor seal failures can lead to pressure loss, velocity changes, and inconsistent product flow, compounding contamination risks during transload operations.

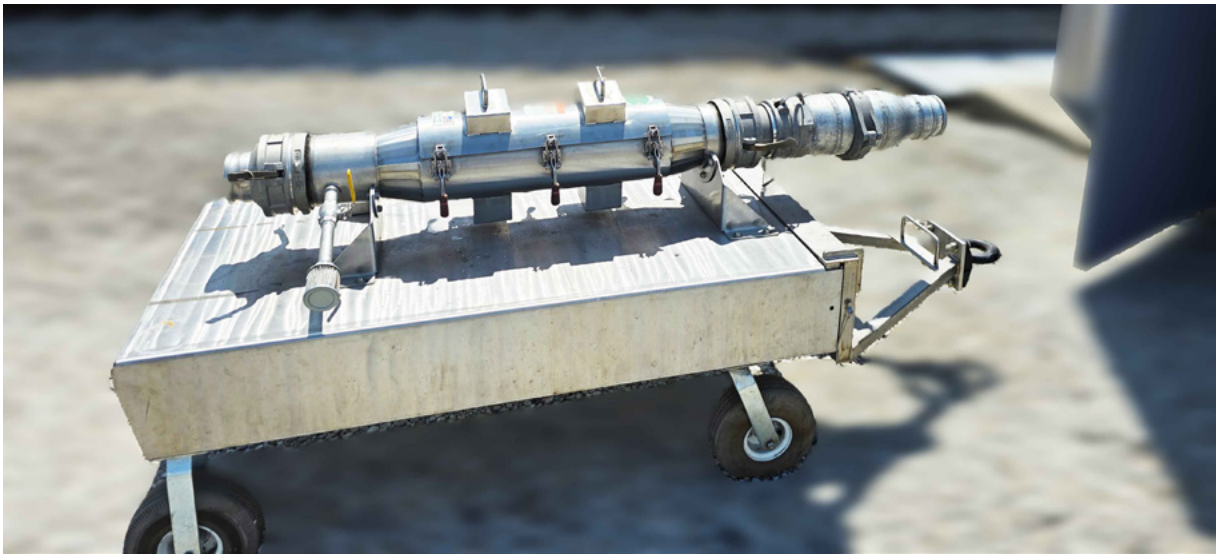
Solution: Bullet-Style Pneumatic Line Magnet System

To overcome these challenges, the customer implemented a bullet-style pneumatic magnetic line system engineered specifically for dilute-phase pneumatic conveying and transloading applications.

Key Engineering Advantages

Consistent Pressure & Flow Control

The system maintains steady pressure across the line with no flow drop or velocity loss, ensuring uninterrupted material transfer. A ball-valve adjustment allows operators to fine-tune conveying speed—especially important when product chunks build up on railcar screens. As buildup occurs and velocity increases, the valve can be adjusted in real time to maintain optimal flow conditions.



Advanced Magnetic Separation

The pneumatic line magnet features a cylindrical magnetic field with seven elevated magnetic poles, creating multiple capture points for ferrous fines and tramp metal. This design significantly increases metal recovery efficiency, even at high conveying velocities.

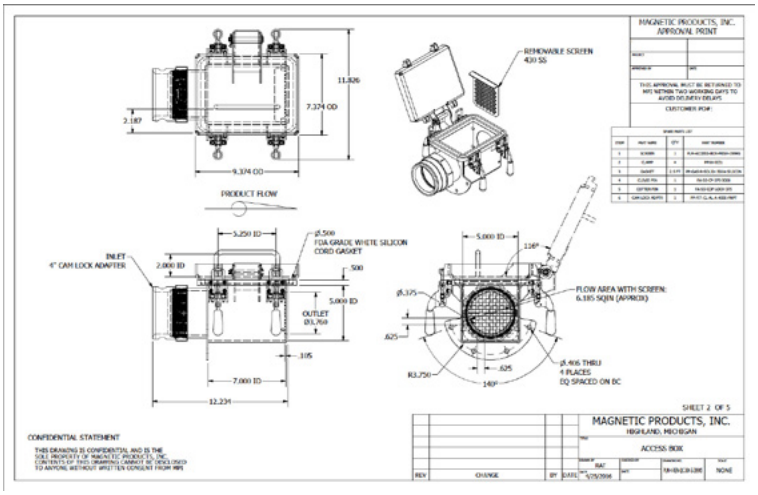
Wash-Off Prevention & High Retention

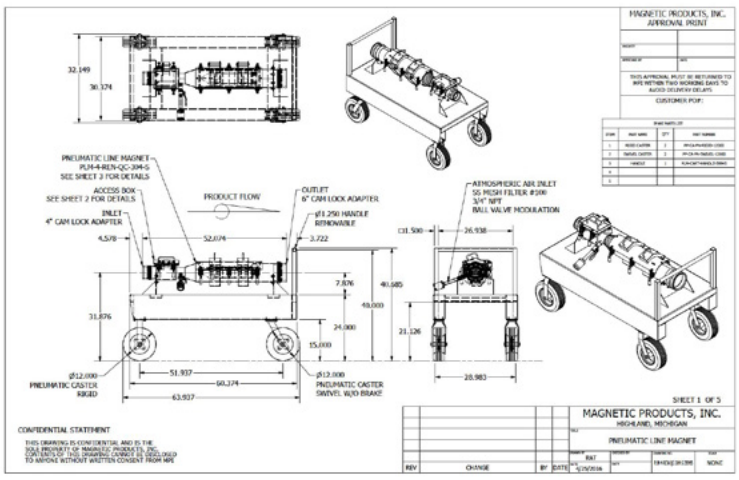
- Tall, angled magnetic poles improve retention and reduce the risk of metal wash-off
- Captured metal is held outside the product stream until cleaning
- Continuous operation is maintained without interrupting material flow

Superior Sealing & Sanitary Design

Unlike competing systems, this solution incorporates:

- DE-STA-CO quick-clean clamps to eliminate over-compression
- A Sani-Tight™ gasket that ensures a leak-proof, repeatable seal
- A "bullet-proof" sealing interface that prevents both product loss and external contamination





Results

The implemented pneumatic line magnet delivered immediate and measurable benefits:

- Reliable ferrous metal detection at every transload point
- Verified assurance that each truck is free from tramp metal contamination
- Reduced risk of recall, rework, or end-user rejection
- Improved seal integrity with zero product leakage
- Lower maintenance and reduced downtime
- Enhanced confidence in both inbound and outbound material quality

Summary

By replacing a flawed clamp-and-gasket design with a purpose-built pneumatic line magnet engineered for dilute-phase conveying, the customer achieved a safer, cleaner, and more reliable transloading process. The system's innovative magnetic configuration, pressure-stable flow control, sanitary sealing, and rugged mobility directly addressed the client's real-world operating challenges.

Knowing that each railcar transfer and outbound truck is inspected for ferrous contamination provides invaluable peace of mind. The Pneumatic Line Magnet not only protects product integrity but also safeguards customer trust—making it a critical asset in modern bulk material handling and pneumatic processing operations.

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