RIDING THE CRITICAL MINERALS BOOM: How Tariffs and Shoring Strategies Fuel Bulk Bag Demand

Executive Summary

The critical minerals mining industry is undergoing a transformative surge, propelled by global trade policies such as tariffs and strategic shoring initiatives—onshoring, nearshoring, and friendshoring. These dynamics are reshaping supply chains, amplifying demand for critical minerals like lithium, cobalt, nickel, and rare earth elements, which are vital for clean energy technologies, high-tech industries, and national security applications. Flexible Intermediate Bulk Containers (FIBCs), commonly known as bulk bags, have become essential for the efficient transport, storage, and processing of these minerals and related bulk solids, such as those used in water treatment and environmental management. This white paper explores the interplay of trade policies, industry growth, and the critical role of bulk bag handling machinery in addressing logistical challenges and enhancing operational efficiency. It concludes with actionable insights for mining companies and highlights advanced bulk bag handling solutions to meet the industry's evolving needs.

Introduction

The global race for critical minerals—essential components in electric vehicle (EV) batteries, wind turbines, solar panels, and defense technologies—is intensifying. As nations strive to secure reliable supplies, trade policies and strategic shoring initiatives are reshaping the critical minerals landscape. U.S. tariffs on Chinese imports, retaliatory export controls by China, and emerging policies like the European Union's Carbon Border Adjustment Mechanism (CBAM) are disrupting traditional supply chains. Concurrently, onshoring, nearshoring, and friendshoring strategies are driving investments in domestic and allied production to reduce reliance on adversarial suppliers. These shifts present logistical challenges, including the need for cost-effective, integrable, and safety-compliant material handling solutions. Bulk bags, paired with advanced handling machinery, are uniquely positioned to address these challenges, offering flexibility, efficiency, and sustainability. This white paper examines how tariffs and shoring strategies are fueling the critical minerals boom and the pivotal role of bulk bag systems in optimizing supply chains.

SECTION 1: The Critical Minerals Boom – Catalysts and Challenges

A Surge in Demand

The demand for critical minerals is projected to increase up to sevenfold by 2030, driven by the global transition to clean energy and the proliferation of high-tech industries. Lithium, cobalt, nickel, and rare earth elements are critical for manufacturing EV batteries, renewable energy systems, and advanced electronics. Additionally, national security applications, such as defense technologies and aerospace components, rely heavily on secure access to these materials. The International Energy Agency (IEA) estimates that achieving net-zero emissions by 2050 will require a sixfold increase in mineral production, underscoring the urgency of scaling mining and processing operations.

Trade Policies as Catalysts

Global trade policies significantly impact the critical minerals market. The U.S. has a 20% broad tariff on all Chinese imports, escalating to 25% for critical minerals. China has retaliated, expanding export controls on minerals like gallium, germanium, antimony, tungsten, tellurium, bismuth, indium, molybdenum, and seven rare earth elements and their magnets.

In North America, the U.S. imposed a 25% duty on most Canadian and Mexican imports as of March 4, 2025, though Canadian energy and critical minerals face a reduced 10% tariff. USMCA-compliant goods are exempt. These protectionist measures aim to secure domestic supply chains and reduce foreign reliance, reshaping global mining and trade dynamics.

In Europe, the EU's Carbon Border Adjustment Mechanism (CBAM), set to take effect in 2026, will impose carbon tariffs on imports of carbon-intensive goods, including certain minerals and processed metals. This policy incentivizes cleaner production methods but adds complexity to global trade, encouraging regionalized supply chains. These trade disruptions are accelerating investments in domestic and allied mining operations, creating opportunities and challenges for the industry.

Shoring Strategies: Onshoring, Nearshoring, and Friendshoring

Shoring strategies are redefining global supply chains. Onshoring, bolstered by U.S. policies like the Inflation Reduction Act (IRA) of 2022, provides tax incentives and grants to expand domestic mining and processing. For example, the IRA allocates $7.5 billion for EV supply chain development, including critical mineral extraction and refining. This has spurred projects like lithium mines in Nevada and cobalt processing facilities in the Midwest.

Nearshoring strengthens regional supply chains, particularly within North America. Mexico, with its rich deposits of lithium and silver, and Canada, a leading producer of nickel and cobalt, are emerging as key partners under the USMCA. Cross-border logistics are becoming more critical, requiring efficient material handling systems to minimize costs and delays.

Friendshoring, promoted through initiatives like the G7's Minerals Security Partnership, encourages production in allied nations such as Australia, Japan, and the EU. This strategy reduces dependence on adversarial suppliers while fostering collaborative trade networks. However, these shoring initiatives face significant challenges, including high capital costs, stringent environmental regulations, and lengthy permitting processes, which can delay project timelines by years.

Logistical Challenges

The rapid expansion of critical minerals production demands robust logistics solutions. Mines and processing plants must handle large volumes of raw ore, refined minerals, and associated bulk solids, such as lime, activated carbon, and coagulants used in water treatment. Environmental compliance, worker safety, and cost efficiency are paramount, particularly as operations scale to meet demand. Efficient material handling systems, like bulk bags and their associated machinery, are critical to overcoming these challenges and ensuring operational success.

SECTION 2: The Pivotal Role of Bulk Bags in Critical Minerals Mining

Versatility and Efficiency

Flexible Intermediate Bulk Containers (FIBCs), or bulk bags, are high-capacity containers capable of holding up to 4,000 pounds of material. They are designed to transport, store, and process a wide range of bulk solids, from raw ores to processed minerals and chemicals used in environmental applications. Compared to traditional drums or rigid containers, bulk bags offer significant advantages:

- **Cost-Efficiency:** Bulk bags reduce packaging and transportation costs by up to 30% compared to drums, as they require less material and can be stacked efficiently.
- **Reusability and Recyclability:** Made from durable polypropylene, bulk bags can be reused multiple times and recycled, aligning with corporate ESG goals and environmental regulations.
- **Safety:** By minimizing manual handling, bulk bags reduce workplace injuries, particularly when paired with automated handling systems.
- **Versatility:** Customizable designs, including anti-static and conductive options, accommodate hazardous or flammable materials like lithium and cobalt.

Applications in Mining and Water Treatment

In critical minerals mining, bulk bags are used across the supply chain:

- **Extraction and Transport:** Raw ores, such as lithium spodumene or cobalt concentrates, are transported from mines to processing facilities in bulk bags, reducing spillage and contamination risks.
- **Processing:** Refined minerals, such as battery-grade lithium carbonate or nickel sulfate, are stored and shipped in bulk bags to battery manufacturers or other end-users.
- **Storage:** Weather-resistant bulk bags protect minerals from moisture and degradation during storage, ensuring quality and compliance with industry standards.

In water treatment, bulk bags handle chemicals like lime, activated carbon, and coagulants used in wastewater management at mining sites. These materials are critical for neutralizing acidic runoff and meeting environmental regulations, such as those enforced by the U.S. Environmental Protection Agency (EPA) or Canada's Environmental Protection Act.

Scalability and Sustainability

Bulk bags support the scalability required by shoring initiatives. Their lightweight design reduces transportation emissions, while their large capacity minimizes the number of shipments needed. As mining operations expand in response to tariffs and incentives, bulk bags provide a flexible, cost-effective solution for handling increased volumes of materials.

SECTION 3: Bulk Bag Handling Machinery – Meeting Industry Needs

Addressing Operational Demands

The growing scale of critical minerals mining requires advanced bulk bag handling machinery to ensure efficiency, safety, and compliance. Key equipment includes:

- **Bulk Bag Fillers:** (also known as FIBC, Big Bag and Jumbo Bag Fillers) These systems automate the filling process, ensuring precise, high-speed operations. Features like dust-control mechanisms and adjustable frames accommodate various bag sizes and material properties, such as abrasive ores or fine powders.
- **Bulk Bag Dischargers:** (also known as FIBC, Big Bag and Jumbo Bag unloaders) These machines facilitate safe and efficient unloading of bulk bags, minimizing material loss and dust emissions. They are critical for handling hazardous minerals like cobalt or hygroscopic chemicals prone to clumping.
- **Bulk Bag Conditioners:** (also known as FIBC, Big Bag and Jumbo Bag Massagers) These devices loosen bulk solids that have solidified during storage or shipment, enabling smooth discharge through bag spouts. They are particularly recommended for hygroscopic materials, such as certain chemical additives used in water treatment, which can harden due to moisture absorption.

Case Study: Copper Concentrate in Canada

Vale Canada Limited (ONTARIO, Canada) processes ores containing nickel, copper and other metals. Starting in 2012 they undertook a billion-dollar Clean Atmospheric Emissions Reduction (AER) project to reduce sulfur dioxide stack emissions by 85 percent. After analyzing the total life of the mines and the long-term projections of mine capacity in the region, the company decided to focus on nickel production and sell copper concentrate to other companies instead of refining it in-house.

Vale decided to proceed with a material handling system capable of packaging 27 to 35 tons/h (24 to 32 metric tons/h) of the copper concentrate into bulk bags by integrating a Flexicon automated bulk bag filling system into its existing process.

Vale's Copper Bagging System Boosts Efficiency and Safety

Vale's copper concentrate, after de-watering and drying, has a texture similar to that of sand and contains 60 to 70 percent copper. It is conveyed to two large feed hoppers positioned above the dual bulk bag filling stations, each hopper holding 11 tons (10 metric tons), enough to fill five bulk bags.

In addition to fitting into the limited space available, the dual bulk bag filler configuration provides capacity, flexibility, and redundancy for the bag filling process. Automatic pallet dispensing reduces wait time and the likelihood of worker injury.

SECTION 4: Strategic Implications for the Mining Industry

Onshoring and Localized Logistics

Onshoring increases the need for localized logistics solutions. Bulk bags, with their low cost and high capacity, are ideal for domestic operations, reducing reliance on complex international shipping networks. Automated handling systems further enhance efficiency, enabling mines to scale production rapidly.

Nearshoring and Friendshoring

Nearshoring and friendshoring require robust cross-border supply chains. Bulk bags streamline transportation across North America and allied nations, reducing costs and risks associated with customs delays or tariff disputes. Their standardized design ensures compatibility with global logistics infrastructure.

Tariff Uncertainties

While exemptions for minerals like cobalt highlight their strategic importance, tariff uncertainties underscore the need for cost-effective solutions. Bulk bags and handling machinery minimize operational costs, providing a buffer against fluctuating trade policies.

Future Outlook

As demand for critical minerals grows, investments in bulk bag infrastructure will increase. Innovations in bag materials,

such as biodegradable polymers, and advanced machinery, like robotic handling systems, will enhance sustainability and efficiency. Mining companies that adopt these solutions will gain a competitive edge in the evolving market.

Conclusion

The critical minerals mining industry is at a turning point, driven by tariffs and shoring strategies that prioritize secure, diversified supply chains. Bulk bags and advanced handling machinery offer cost-effective, safe, and scalable solutions to meet logistical challenges.

By investing in these systems, through a single source supplier like Flexicon, mining companies can enhance productivity, ensure regulatory compliance, and align sustainability goals, by specifying equipment from a single source supplier with global reach. To capitalize on these opportunities, partner with Flexicon who offers the experience of over 25,000 installations and 50+ years of bulk bag handling solutions, including:

- **Bulk Bag Fillers:** Automated systems for precise, high-speed filling of bulk bags, optimized for various mineral and chemical properties.

- **Bulk Bag Dischargers:** Efficient unloading systems that minimize material loss and ensure compliance with safety and environmental standards.

- **Bulk Bag Conditioners:** Specialized equipment to loosen solidified materials, such as hygroscopic chemicals, ensuring smooth discharge and operational efficiency.

Contact **sales@flexicon.com** or call **+1 610 814 2400** to discover how these solutions can empower your operations to thrive in the critical minerals boom.

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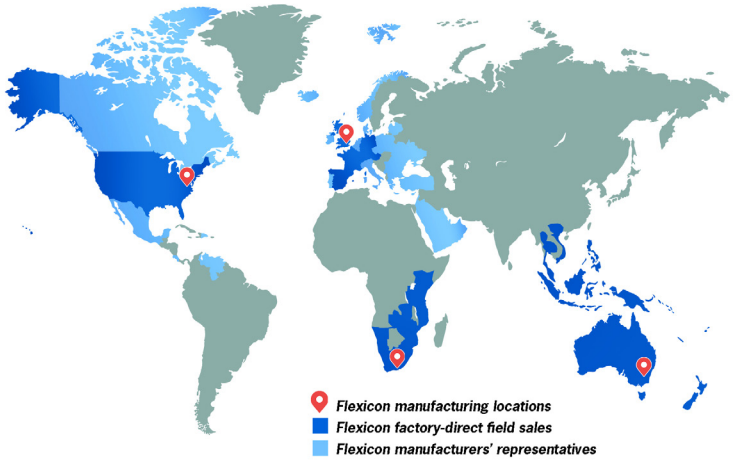
Make adaptability a core component of your process

Integrate modular systems to ensure uninterrupted production and maintain quality

Back it all with a Lifetime Performance Guarantee



Scan the QR code to learn more about Flexicon's approach to critical mining

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