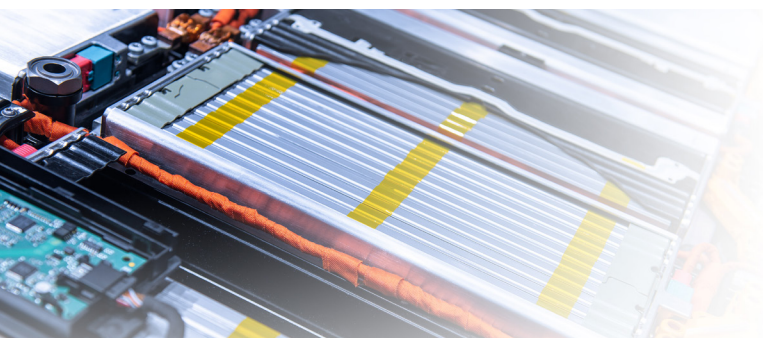


Case Study/From Loss to Recovery: A Filtration Success Story in LFP Cathode Material Production



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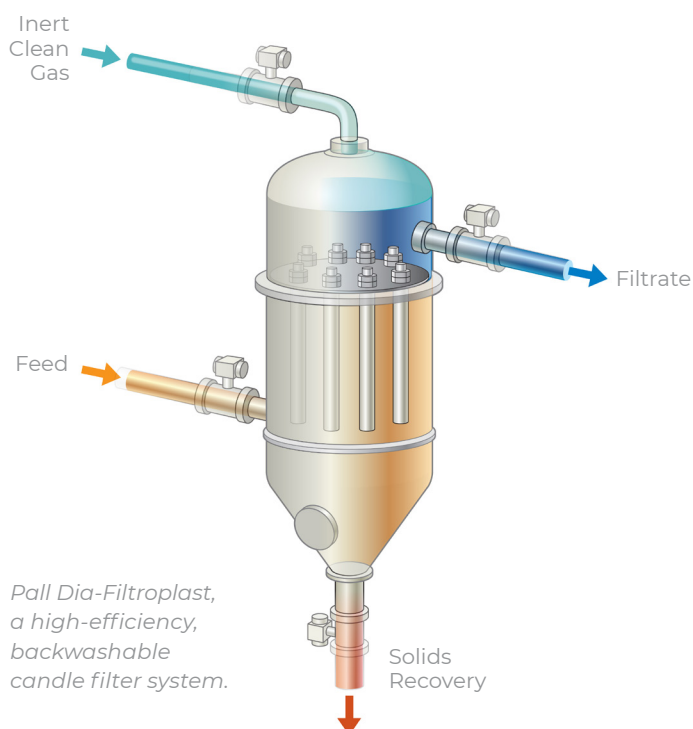
Optimizing Filtration Efficiency in LFP Cathode Material Production



Introduction

In the production of lithium iron phosphate (LFP) cathode active materials, filtration plays a critical role in ensuring product quality, process efficiency, and environmental compliance*. The ammonium-based synthesis method for ferric phosphate generates process streams that contain valuable solids and impurities. Without effective filtration, these streams can lead to material loss, equipment fouling, and increased operational costs.

The customer aimed to maximize the recovery of ferric phosphate and ammonium phosphate while ensuring that the treated effluent met stringent environmental standards for industrial wastewater*. Advanced filtration solutions were essential to recover valuable materials, protect downstream systems, and support sustainable manufacturing practices.



Problem

A leading LFP cathode material manufacturer in China faced significant challenges in its ammonium-based ferric phosphate production process:

- **Low Filtration Precision:** The existing plate frame filters had a filtration rating of $\geq 5 \mu\text{m}$, which was insufficient to capture fine ferric phosphate particles.
- **Material Loss:** Between 0.3%–1% of ferric phosphate was lost in the mother liquor and wash water, reducing overall yield.
- **High Maintenance and Labor:** Frequent clogging and replacement of filter cloths increased manual labor and led to inconsistent filtration performance.
- **Downstream System Damage:** Residual particles in the filtrate caused blockages and damage to ultrafiltration membranes in the water treatment system, compromising environmental compliance and increasing maintenance costs.

Pall solution

Lab tests were conducted by Pall to validate the solution. To address these issues, the customer implemented **Pall Dia-Filtroplast**, a high-efficiency, backwashable candle filter system with a nominal filtration rating of $< 1 \mu\text{m}$. Installed downstream of the plate frame filter, this system provided:

- **Enhanced Particle Retention:** Effectively captured fine ferric phosphate particles from the mother liquor and wash water.
- **Improved Material Recovery:** Significantly increased the yield of ferric phosphate and recovery of ammonium phosphate.
- **Protection of Downstream Equipment:** Prevented fouling and damage to ultrafiltration membranes, ensuring stable operation of the water treatment system.
- **Reduced Manual Intervention:** Automated backwash capability minimized labor and maintenance frequency.

* See over

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CONCLUSION

By implementing Pall Dia-Filtroplast's advanced candle filtration system, the customer successfully addressed key operational challenges in LFP cathode material production. The solution enabled finer particle capture, improved material recovery, and safeguarded downstream water treatment systems. With reduced manual intervention and enhanced process stability, the customer is now better positioned to meet both production efficiency goals and environmental compliance standards. This case underscores the value of precision filtration in driving sustainable and high-performance battery material manufacturing.

* GB 8978-1996: Integrated Wastewater Discharge Standard

This standard outlines limits for various pollutants in industrial wastewater. Key parameters typically include:

Suspended Solids (SS): ≤ 70 mg/L (Class I standard)

Chemical Oxygen Demand (COD): ≤ 100 mg/L

Ammonia Nitrogen ($\text{NH}_3\text{-N}$): ≤ 15 mg/L

Total Phosphorus (TP): ≤ 0.5 mg/L

Heavy Metals (e.g., Fe, Mn, Ni, Cr): Varies by metal, typically in the range of 0.1-1.5 mg/L

pH: 6-9



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