

Powering the Future: Tackling Contamination in Lithium-Ion Battery Manufacturing



CASE STUDY

PICSCELLEN



Pall Corporation is a leading global provider of filtration, separation, and purification solutions to industries across the world. In this case study, we will explore how Pall's process contamination control solutions helped a leading battery manufacturer remove fine particles from nitrogen used as a carrier gas in the electrolyte filling, resulting in significant benefits for the company.

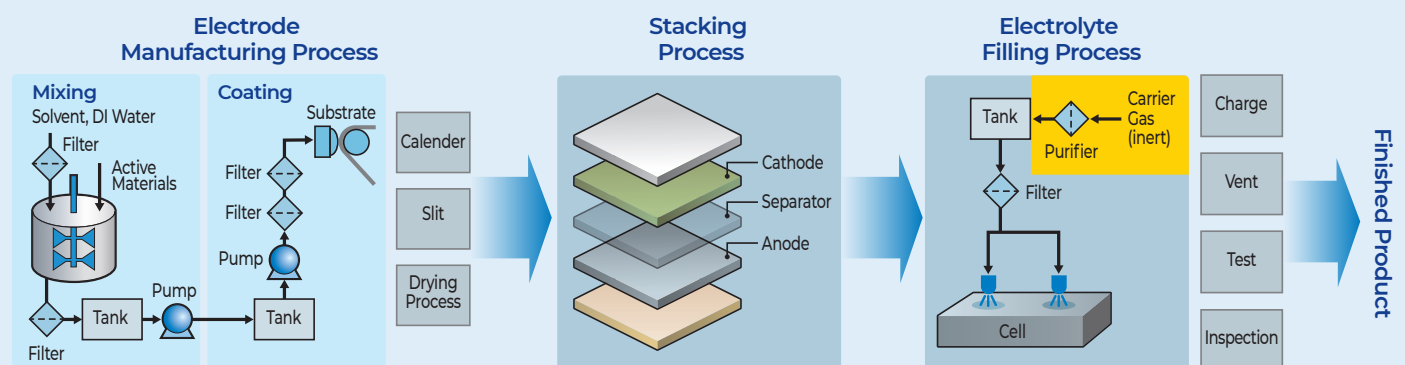
Background

The battery manufacturer in question is a global leader in the production of lithium-ion batteries used for many applications, including electric vehicles and consumer electronics. The company was experiencing high levels of fine particle contamination in the nitrogen used as a carrier gas in the electrolyte filling process at one of their new facilities. Nitrogen (N₂) and argon (Ar) are typical inert carrier gases used in the process. Moisture in either the carrier gas or the electrolyte can result in the formation of hydrofluoric acid (HF) from fluoride lithium salts. The electrolyte must be protected from moisture, as HF can corrode certain metals, including piping on equipment or internal battery components. This contamination was causing issues with the performance and reliability of the electrolyte in the batteries, leading to increased costs and decreased efficiency.

Why is it important to remove particles from nitrogen carrier gas?

- Battery performance and reliability:** Fine particles and water in the nitrogen gas can carry over into the electrolyte, contaminating the battery cell. These contaminants can cause the battery to overload, affecting the performance and safety of the battery operation. Removing these particles ensures that the batteries are of high quality and will perform safely as expected.
- Efficiency:** Contamination in the nitrogen gas used in battery assembly can slow down production times and lead to increased rework. Filtering particles from the gas helps to increase efficiency and productivity.
- Cost savings:** Removing particles from the nitrogen gas used in battery assembly reduces the chances of defective batteries and the need for rework, resulting in cost savings for the company.
- Environmental protection:** Using clean nitrogen gas in the battery assembly process helps to ensure that the batteries are produced in an environmentally friendly way, which is becoming increasingly important in today's world.

Figure 1: Battery assembly manufacturing process including nitrogen gas highlighted in yellow



Powering the Future: Tackling Contamination in Lithium-Ion Battery Manufacturing



Solution

Pall Corporation partnered with the battery manufacturer to assess the situation and propose a solution. Based on a comprehensive analysis of the company's processes and equipment, Pall recommended a custom-designed filtration system consisting of a series of high-efficiency gas filters including Pall's high-performance Emflon® filter cartridges, designed to capture particles as small as 0.003 microns with efficiencies greater than 99.98%.

The system was able to effectively remove fine particles from the nitrogen, resulting in a significant reduction in contamination.

Results

The battery manufacturer saw several benefits including:

Improved battery performance and reliability:

The reduction in fine particle contamination in the nitrogen used in the battery assembly process led to enhanced electrolyte purity resulting in better performance and reliability of the batteries. In addition, there were fewer defective batteries and less rework required, saving the company time and money.

Increased efficiency: The battery manufacturer increased the efficiency of their battery assembly process thanks to the reduced contamination levels. This resulted in faster production times and an overall increase in productivity.

Reduced costs: By improving the performance and reliability of the batteries and increasing efficiency, the company reduced the costs associated with reworking or replacing defective batteries.

Conclusion

Pall Corporation's filtration system helped a leading battery manufacturer remove fine particles from the nitrogen used as a carrier gas in the electrolyte filling process in their battery assembly plant. This resulted in several benefits for the company, including improved battery performance and reliability,

increased efficiency, and reduced costs. Pall's expertise in filtration and separation and its ability to provide custom-designed solutions made it the perfect partner for this battery manufacturer to overcome their challenges.



PALL CORPORATION

Corporate Headquarters

Port Washington, NY, USA
+1-800-717-7255 toll free (USA)
+1-516-484-5400 phone

European Headquarters

Fribourg, Switzerland
+41 (0)26 350 53 00 phone

Asia-Pacific Headquarters

Singapore
+65 6389 6500 phone

Visit us on the Web at www.pall.com/industry

Contact us at www.pall.com/contact

Pall Corporation has offices and plants throughout the world. To locate the Pall office or distributor nearest you, visit www.pall.com/contact.

The information provided in this literature was reviewed for accuracy at the time of publication. Product data may be subject to change without notice. For current information consult your local Pall distributor or contact Pall directly.

IF APPLICABLE Please contact Pall Corporation to verify that the product conforms to your national legislation and/or regional regulatory requirements for water and food contact use.

© Copyright 2024, Pall Corporation. Pall,  and Emflon are trademarks of Pall Corporation.
® Indicates a trademark registered in the USA.

PICSCHELLEN Feb
ruary 2024