Gas Filtration for Cathode Active Materials in the Electric Vehicle Battery Production

CASE STUDY

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Background

The global awareness regarding climate change combined with the alarming pollution levels recorded in megacities and the continuous uncertainty on the oil price trend drive the acceleration of the market demand for Electric vehicles (EV).
A report from Allied Market Research said that the global electric vehicle battery market is projected to reach at $84 billion by 2025, growing at a CAGR of 17.2% from 2018 to 2025.

This exponential growth is accompanied by massive investments along all the production value chain, continuous technical innovations and new quality standards.

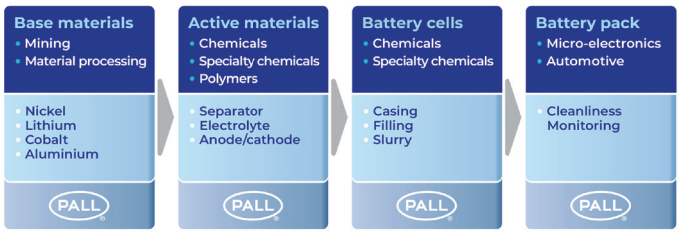
The EV battery production process is a very complex process taking place in different market segments like Mining, Specialty Chemicals, Polymers or Industrial Manufacturing. At each stage of its value chain, there is a constant requirement to produce the purest active materials or the cleanest components or sub-systems.

To achieve the required levels of purity or cleanliness, filtration and separation solutions are fully integrated into the production process itself whatever the nature of the streamlines: solid, liquid or gaseous.

To meet the specification of the EV battery manufacturers, high performance filtration solutions are required at the different fabrication stages to produce pure and uniform active materials as quality impacts not only the overall performance of the battery, its thermal stability, but also its cost per KWh.

QA controls are implemented all along the EV battery production value chain.

Typical Applications



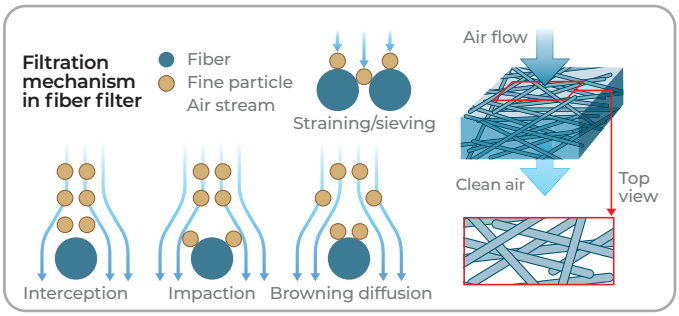
Problem

For its new manufacturing plant, a major chemical company wanted to install appropriate filtration solutions on its pressurized gas circuits feeding its many processing lines used to produce pure cathode active materials.

To really achieve and maintain over time a high degree of purity and excellent product characteristics, no traces of liquid or solid contaminants such as oil or grease were required in the gas streams.

The chemical company asked us to define the appropriate filtration technologies and size the systems to install on its gas streams.

Main Air Filtration Mechanisms and Filtration Systems



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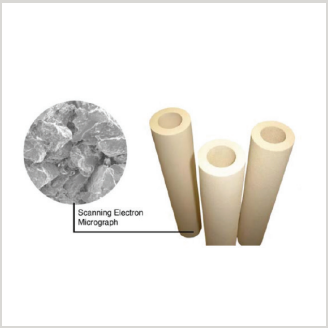
Pall Solution

The selection of the filtration and separation solutions was mainly driven by 2 factors: the operating conditions of the different pressurized gas lines and the micron ratings to consider to achieve the right degree of purity required by the process itself, e.g. no traces of oil, grease, water and solid contaminants, particularly metallic and carbon particles. The sizing of the filters was defined to ensure the best filtration performance while minimizing the total cost of ownership.
As a general overview, find the technologies we selected with the chemical company:

- Pall Profile® Coreless 0.3 µm on CDA line (Clean Dry Air)
- Profile Coreless coarse grade and 0.3 µm on FCA line (Carbon Free Air)
- Pall Profile Coreless 0.3 µm on N_2
- Pall Aerolith® S 05 (<1 µm) on pure O_2

Note: In case of more severe cleanliness specifications on gas applications, finer filter ratings are available.

Pall Profile Coreless Series



Pall Aerolith S Series

Conclusion

Pall defined with the chemical company the air filtration and separation technologies and solutions to install in its new manufacturing plant in order to deliver pure gases required to produce its high-quality cathode active materials.
To minimize the cost of ownership, ensure a continuous production and simplify the maintenance operations as much as possible different configurations of vessels were considered on the pressurized gas lines – single & multi-element vessels, simplex & duplex systems, 304L & 316L stainless steel.

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