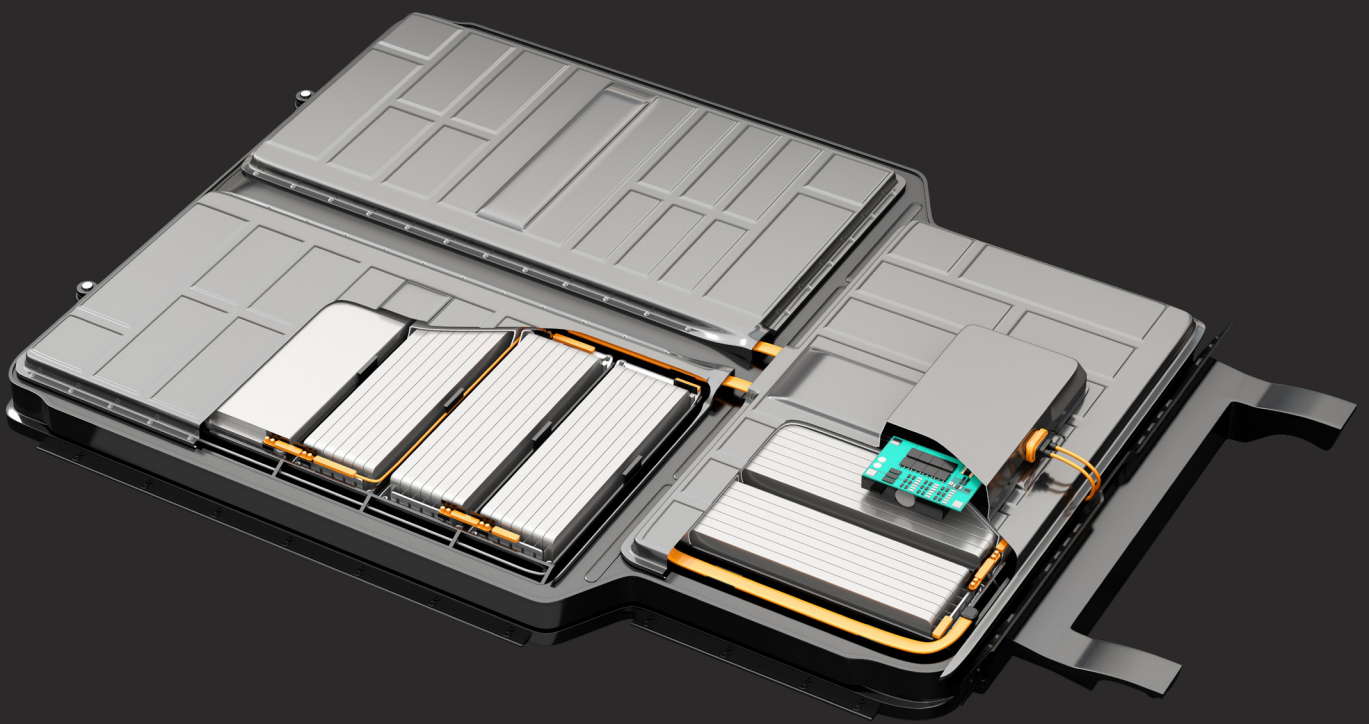
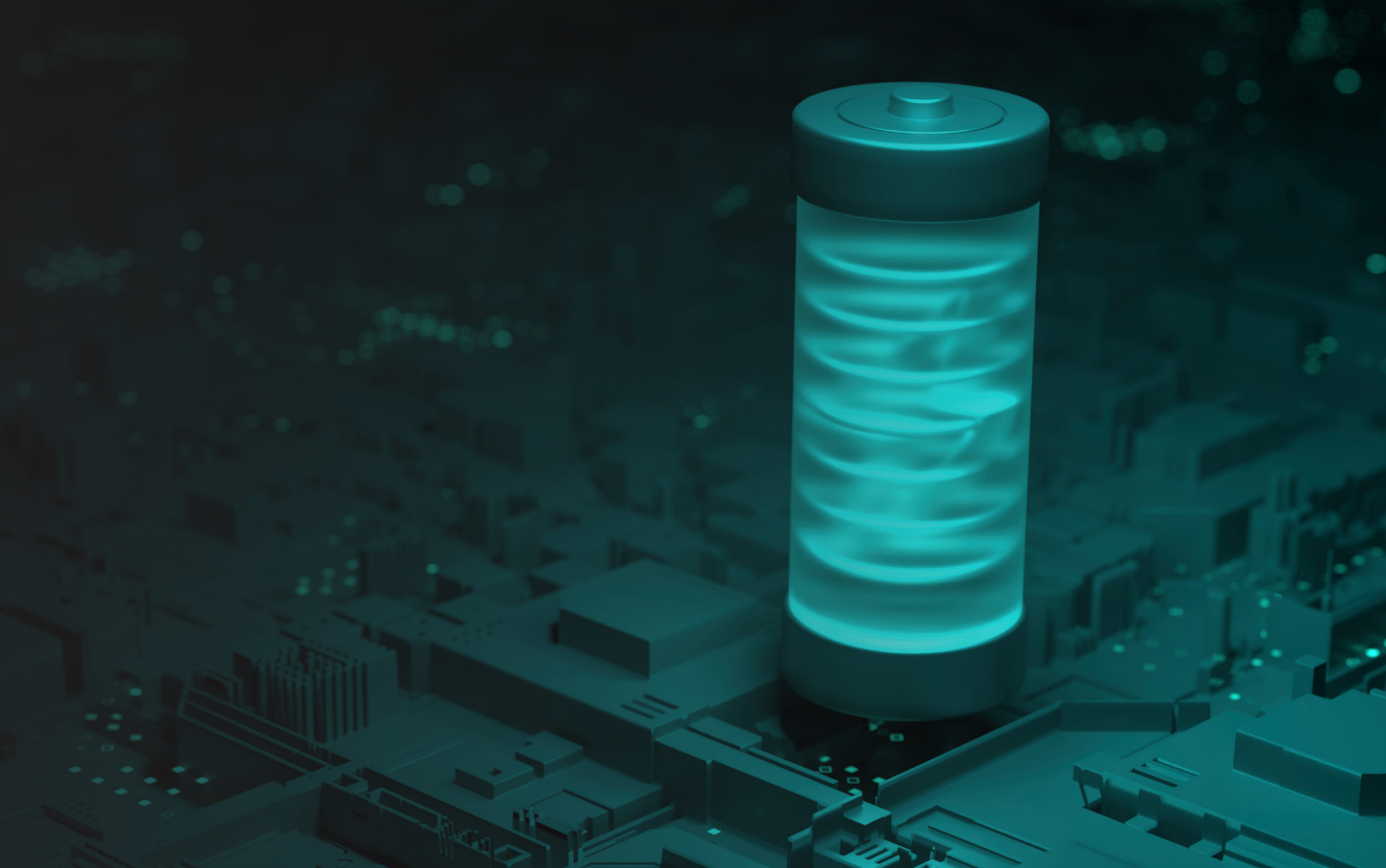


Battery Production

Efficiency-driven production processes



Powder Management in Battery Production with Piab



Piab transforms battery production and recycling with its advanced vacuum conveying solutions, ensuring the purity and integrity of powdered materials throughout the process. As the battery industry evolves, handling delicate anode, cathode, electrolyte, and separator materials without cross-contamination or dust emission becomes paramount. Piab's vacuum conveyors are the choice of leading material producers and battery cell manufacturers for their efficiency, sustainability, and reliability.

Why Piab vacuum conveyors stand out:

- Contained, avoids cross-contamination
- Sustainable with a low carbon footprint
- Durable and resistive to abrasion
- Seamless integration to production line
- Reliable with low maintenance and high service uptime
- Scalable through modular design
- User-friendly
- Gentle to the product
- Maintains consistent transportation process with required throughput
- Can be switched between chemistries or processes
- Versatile with a small footprint
- Short delivery time

Materials where Piab vacuum conveying is the optimal solution:

- Green coke and carbon black
- Cathode materials, both mixed and elemental such as: Li, Al, LCO, NCA, MNC, LMO, LFP
- Anode materials, such as: graphite, LTO, silicon
- Plastic powders for separator foils
- Solid state electrolyte salts
- Black mass and recovered ores
- Other critical materials



Quick Facts

Vacuum conveying is ideal for conveying "black mass" and other recovered materials in battery recycling, enhancing sustainability.

Vacuum conveying is thought to damage the conveyed materials - which is easily avoided with optimized dense phase conveying by Piab.

From handling large volumes (up to 14 tons/h or 30 000 lbs/h) at the process start to managing smaller, purity-critical volumes at the end, Piab offers solutions for every stage.

Beyond anode and cathode materials, and solid-state electrolytes, Piab conveyors efficiently transport plastic pellets for separator production. They also tackle challenging materials prone to "ratholes" with fluidization techniques.

Where Piab can help:

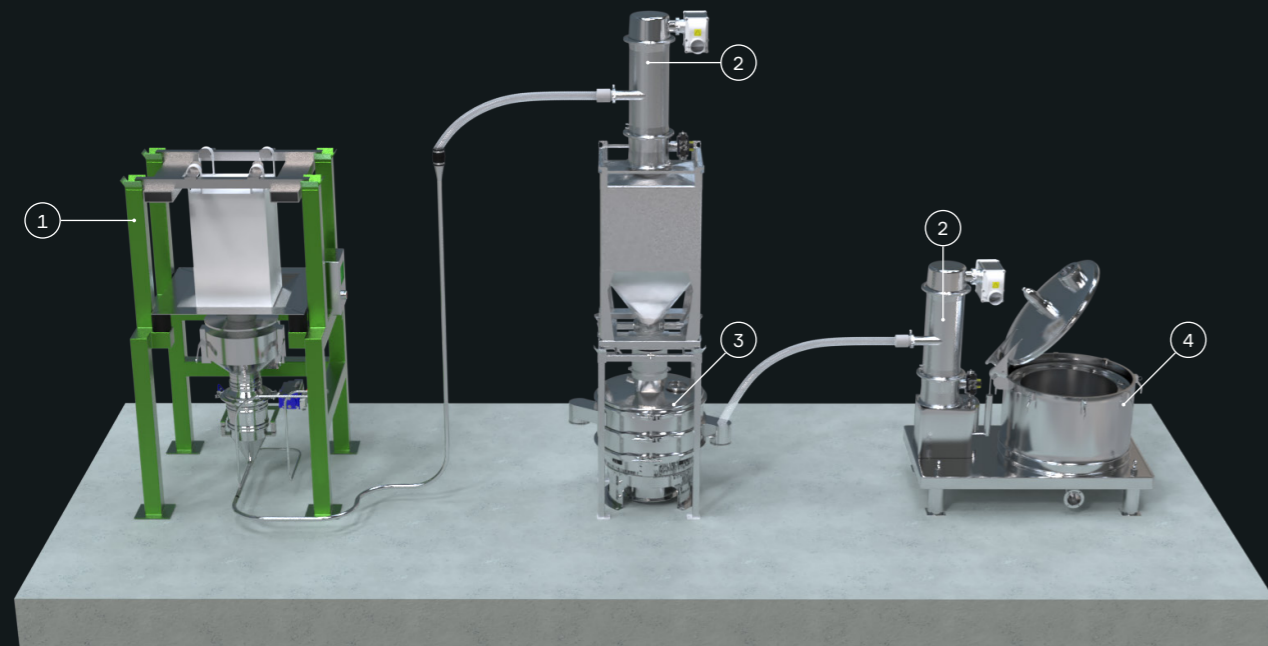


Optimizing anode and cathode manufacturing processes

In this example, ingredients are picked up with a Piab vacuum conveyor (1) from a big bag unloader (2), and from an IBC (intermediate bulk container, 3). Solids can also be introduced into the process through a glove-box. They are conveyed to a sieve (4) and after screening, conveyed to a mixer (5), and finally into a hopper (6). In this setup, the material mix reaches its destination without the risk for product segregation. Solids can also be conveyed into a slurry mixer.



Piab vacuum conveyors can easily be used in the process of manufacturing anode materials as well. In this example, the material is conveyed from a bulk bag (1) with a vacuum conveyor (2), through a vibrating sieve (3), then into a grinder (4). Fine graphite powders can be distributed to spheroidization and ultra-fine pulverization process steps as well – even when material integrity is inspected to the micrometers.

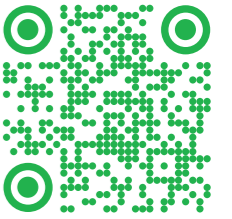


Ideal solutions for battery production

With decades-long proven track record from the metal additive manufacturing and other industries, Piab vacuum conveyors can transfer powders with high bulk density like MSC powders, and materials with extremely high flowability,

like graphite powder with ease. Not only do we offer vacuum conveyors, but also adjacent equipment for material pickup, hoses for transport, vacuum pumps, and control units and level sensors for easy operation of the conveyors.

Do you want to know more?
Go to:
www.piab.com/



Did you know?

Other conveying solutions, such as flex augers, may prove ineffective for handling graphite powder due to the material's fine nature, causing it to fluidize by the pick-up point and to slide back down the tube.

	piFLOW®
Maximum Capacity	14 tons/h (30 000 lbs/h)
Available batch sizes	2 – 56 liters (0,07 - 2 ft³)
Available Certifications	EC, FDA, USDA, ATEX
Main material	ASTM 316L or ASTM 304L
Surface finish	Ra < 0,6 or Ra <3,2
Height*	643 mm (25.3 inch)
Available automation levels	Standard, BVO, CCO, Auto-tuning
Suitable to convey sticky/bridging materials	Yes

* Applicable for the piFLOW®p with 3 litre batch size.



We also offer big bag unloading solutions, glove boxes, metering screws, diverter valves, as well as IBC and drum loading and unloading equipment upon request throughout Europe, provided by IB, a brand by Piab Group.

Global Support and Warranty:
Piab is committed to excellence with a 5-year warranty on most products and offers global support. Our team of application engineers and partners is ready to assist you in selecting the perfect vacuum conveying solution for your battery production needs.



Piab at a glance, your strong and reliable partner

Piab continues to evolve automation through advanced gripping, lifting, and moving solutions and has done so since 1951. We believe in an automated world, where no resources are wasted and no humans are injured. With annual sales of ~1.5 billion SEK, over 1200 employees, and a global presence in more than 100 countries, we help our customers improve their operations for the better daily. Since 2018, Piab has been a part of Patricia Industries, part of Investor AB.

Vacuum Conveying is a significant division within Piab that focuses exclusively on the transport

and movement of powders and bulk materials, handling sensitive powders, granules, and small parts for the pharmaceutical, food, chemicals, additive manufacturing, and battery production industries.

With Application and Customization Centers in the US, Germany, Singapore, and our headquarters in Sweden, we offer individual support and tests for your specific material to assist you in configuring the most optimal solution for your process. Additionally, our offices in France, Poland, Spain, the UK, Brazil, and China offer test facilities for a broad range of Piab's vacuum conveying solutions. They are ready to help you with their extensive experience and know-how.

Share your powder management challenge with us!

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