

INDUSTRIAL AIR FILTRATION

Collect, Clear, Control

Dust Control Solutions for EV Battery Manufacturing



Donaldson[®]
FILTRATION SOLUTIONS

Rapid Market Growth

The expanding market for electric vehicles is driving increased demand for EV batteries, with that market expected to reach nearly USD 155 billion by 2028, according to the International Energy Agency.¹

Changing Regulatory Environment

With this growth comes the need for new battery manufacturing facilities incorporating state-of-the-art equipment and processes, coupled with solutions to meet more stringent regulatory requirements addressing both hazardous raw materials and the fumes, dust and particulates generated during the manufacturing process.

A Proven Partner

Donaldson has a long history of providing reliable solutions for the automotive industry. We work with original equipment manufacturers, engineering firms and Tier suppliers worldwide to design and implement efficient dust, fume and mist collection systems that can help mitigate hazards, improve production quality and protect the environment.

That experience, as well as our global reach, makes Donaldson the ideal partner for gigafactory developers, builders and operators.

1. Fortune Business Insights, Electric Vehicle Battery Market Size
<https://www.fortunebusinessinsights.com/industry-reports/electric-vehicle-battery-market-101700>



PROCESSES

We Know Filtration

Donaldson is a global provider of filtration solutions for manufacturing industries. Our advanced technology, extensive portfolio of filtration products and unrivaled customer support help manufacturers meet their clean air needs and reduce long-term costs of operation.

EV Battery Manufacturing Filtration Applications

We can provide customized dust, fume and mist collection solutions that will help to improve the process environment for both equipment and workers. Our comprehensive portfolio of collectors, extractors, exhaust hoods and filter technology provides the ideal solution at each stage of the EV battery manufacturing process, including:

- Mixing
- Coating
- Material Handling
- Machining/Metalworking
- Drying
- Welding
- Assembly
- Recycling



Mixing



Coating



Metalworking



Assembly

Challenges

At Donaldson, our experienced team understands the challenges associated with EV battery manufacturing.



Need for Efficiency & Uptime

Fine particle dust can hinder processing efficiency by slowing airflow. In some cases, challenging dusts, such as sticky and agglomerative dusts, can clog your system, requiring downtime for maintenance and cleaning. And combustible dust is not only dangerous, but could also result in temporary production shutdowns if not properly identified and addressed through a Dust Hazard Analysis.



Safety Concerns

The manufacturing process for EV batteries often releases potentially dangerous particles into the air, including dust from lead, cadmium, nickel, cobalt and aluminum. Weld fumes also are considered toxic and, over time, can lead to serious health problems if not properly mitigated. Dust from some materials can even be flammable or combustible. Effective dust control is critical for meeting OSHA standards to protect workers from exposure to potentially harmful substances, as well as other regulatory requirements governing fumes, dust and particulates generated during manufacturing.



Industrial Hygiene

A gigafactory needs to have the highest standards in place to ensure that the batteries produced are safe and work properly. That means the equipment and the facility need to remain relatively free from dust and other particulate matter that can impact the consistency and quality of the batteries. A dirty workplace can also make it difficult to attract and retain workers and can send the wrong message to customers.

Solutions

Different parts of EV battery production present different challenges. We offer proven dust control solutions for the entire value chain.

Improve Productivity

Your highly automated, fast-paced manufacturing processes are designed to maximize productivity, and your dust, fume and mist collection efforts need to keep pace. By investing in equipment that has a track record of reliability with accurate specifications, a gigafactory can avoid issues that would otherwise slow down production. Donaldson collectors and filters are engineered to provide outstanding filtration efficiency and energy savings. And our team of experts is always available to provide support and guidance, ensuring that your equipment is up and running smoothly.

Clear the Air

Our team can work with you to implement the proper ventilation and filtration systems to reduce the release of harmful particles, including combustible dust, into the air and address regulatory compliance within your production facility. From the mixing of cathode and anode materials to coating, machining, welding and assembly, our collectors equipped with premium, high-efficiency filters can help improve the process environment, keeping both workers and equipment safe.

Create a Cleaner Process Environment

Our weld fume extraction and dust collection products are versatile, so you can create a system that's customized to your specific needs. Whether you're looking for a turnkey solution or just need some help getting started, Donaldson can help you implement proper ventilation and high-efficiency filters to capture and contain fine particles of potentially harmful materials, helping to ensure the safety and consistency of your EV batteries.

Industrial Filtration Services

Managing your operation's dust collection equipment has never been easier. With a service plan from Donaldson's Industrial Filtration Services, you can take on as much, or as little, of the system's management as you like. The plans include Donaldson's iCue™ connected filtration monitoring technology. Donaldson's team of experts are available 24/7 to monitor your equipment and our certified technicians can manage all maintenance or repair issues on your behalf.

What's Right for You?

Installing an efficient collection system for dust, fume and mist starts with a thorough review of the facility layout and processes.



Work Layout

Is the area open or divided into individual cells?



Space Flexibility

How important is the ability to reconfigure the work layout or rearrange cells?



Production Area

Are there physical space limitations due to size or existing structures?



Production Volume

Given projected/possible expansion, what is the maximum anticipated production volume?



Reliability & Uptime

What type of dust, fume and/or mist is being generated, and which collection system offers the most efficient collection with minimal downtime for filter changeouts, cleaning and maintenance?



Cost & Regulatory Parameters

What is the cost of efficient capture versus the cost of non-compliance?



Case Study

Filtering Fine Dust for Safety & Product Quality

Effectively controlling dust is crucial to ensuring the quality of EV batteries. Dust particles generated in EV battery manufacturing, however, are extremely fine, typically ranging from 0.3 to 0.5 μm . Moreover, the dust is highly flammable and poses an explosion risk, necessitating targeted protective measures.

That's why one of the world's leading manufacturers and innovators of lithium-ion batteries turned to Donaldson for an ambient dust collection solution at their production facility in China.

The company's main products are rechargeable lithium-ion batteries, battery packs and management systems. At their plant, anode electrode manufacturing generates dust from graphite, copper powder and other materials, and cathode electrode manufacturing generates lithium alloy, aluminum powder, etc. Emissions standards are ultra-low ($<2.1\text{mg}/\text{m}^3$), and the nature of the dusts means there is a risk of fire and explosion.

With Donaldson's help, the company installed Donaldson Torit® Downflo® Evolution (DFE) dust collectors with VFD controls. These state-of-the-art collectors, coupled with Donaldson's industry-leading Ultra-Web® fine fiber filtration technology, deliver a small equipment footprint with up to 40% fewer filters, reducing maintenance time and overall cost of operation.

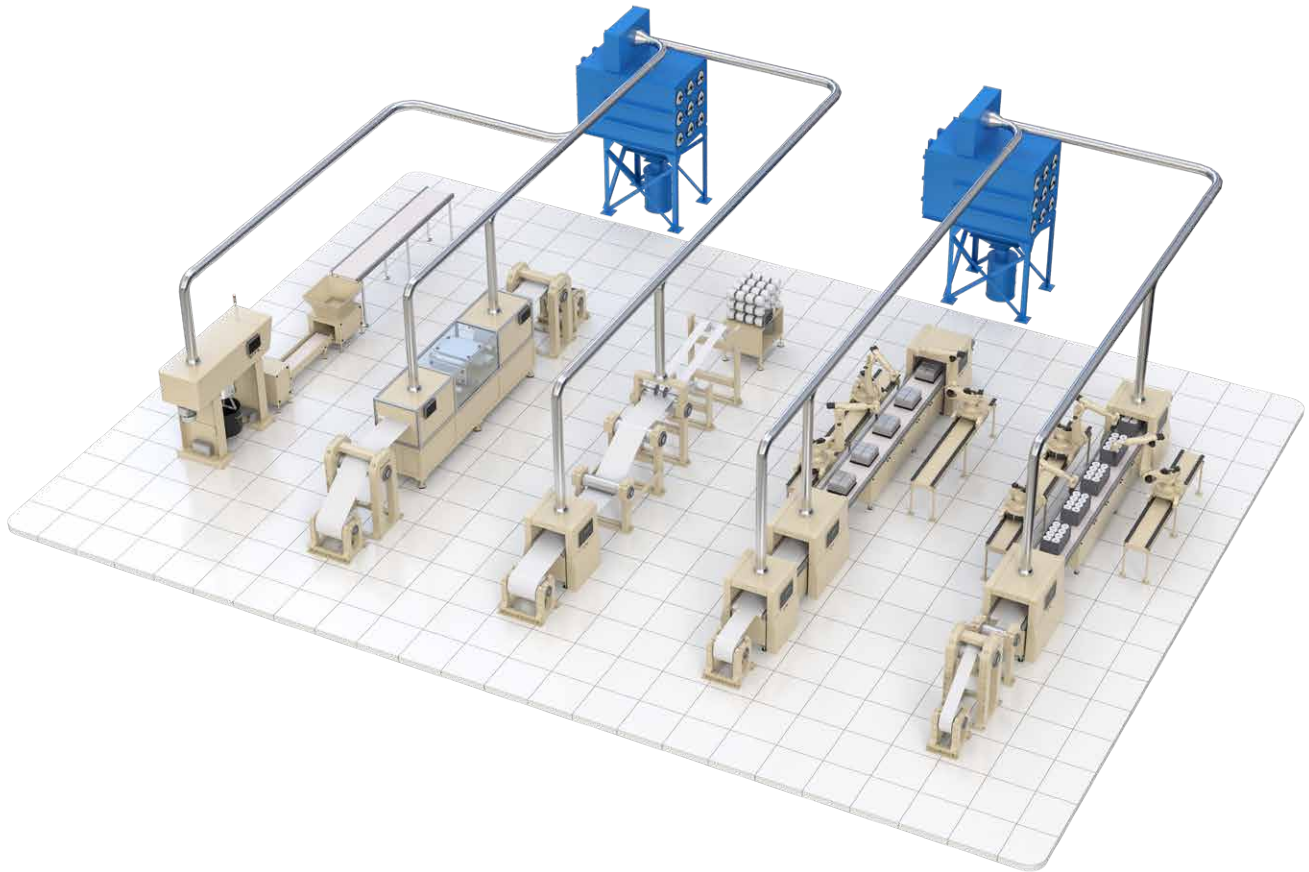
Ultra-Web cartridge filters have a layer of fine fibers that capture particles in submicron sizes down to 0.3 μm . The fine fiber layer also enables surface-loading, so the self-cleaning compressed air pulse of the DFE dust collector is able to clean the filters effectively — keeping pressure drop low and extending filter life. Furthermore, the implementation of unique anti-static technology can effectively reduce the risk of self-ignition caused by dust particles due to static electricity.

After extended use in challenging conditions, the system continues to perform for the manufacturer. The system's design helps the customer meet the region's ultra-low emission level requirements while the collectors' Ultra-Web AS FR filters delivered extended performance minimizing unplanned downtime and filter changeouts.

Safety. Security. Quality.
A winning combination for EV battery manufacturers.



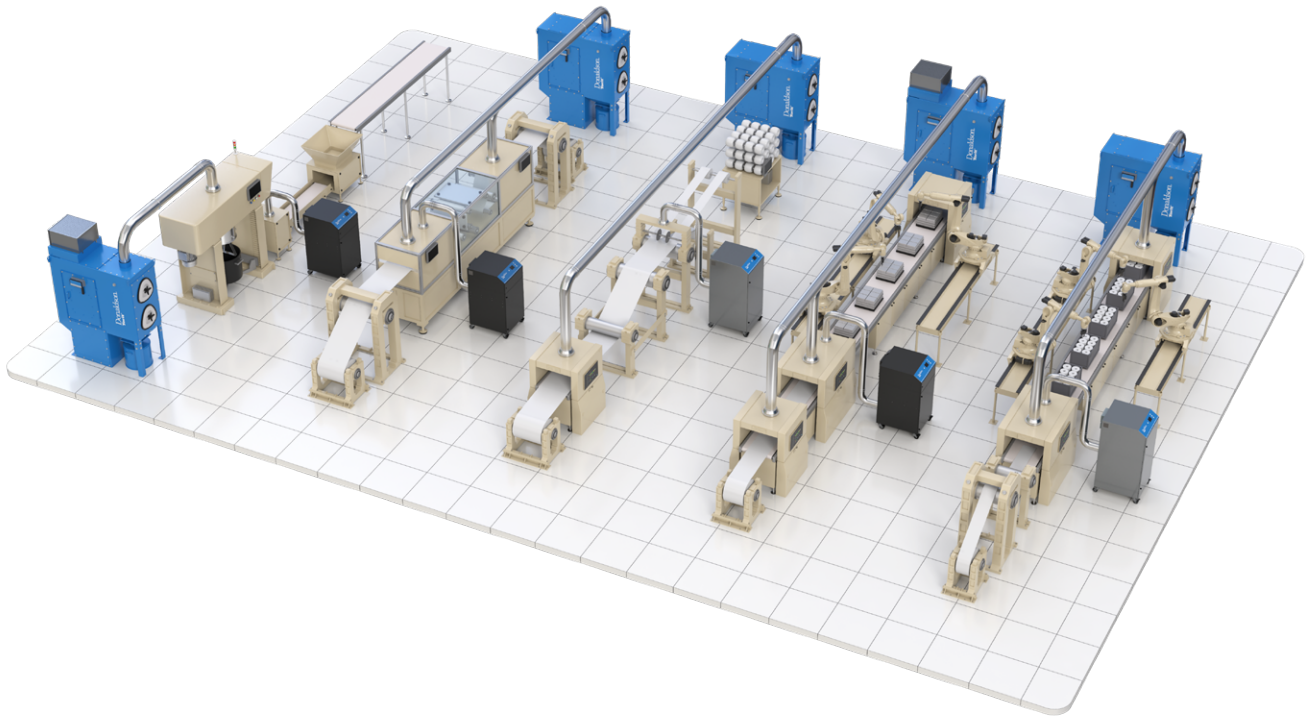
Centralized Collector System



*Dust capture points are for illustrative purposes only.
Actual configurations will vary by application.*

Proper dust collector placement depends on a number of important factors including the combustibility of the dust being generated in your processes, accessibility for maintenance, operating climate, local codes and regulations, and space requirements. To discuss a dust collection solution for your operation, contact your local Donaldson representative.

Localized Collector System



For decades Donaldson has been providing quality dust collectors that have become an integral part of many plant's dust management strategies. When employees are at their peak, so is productivity — and ultimately, a manufacturer's bottom line.

Gigafactory Dust Collection & Filtration Solutions

Donaldson offers a variety of solutions to meet your specific dust, fume and mist control requirements. With more than 250,000 global installations, Donaldson is ready to meet your dust collection challenge.



Downflo® Evolution

The Donaldson Torit® Downflo® Evolution (DFE) cartridge dust collector is capable of reducing equipment size and the number of required filters by up to 40%.



TG Series

The Donaldson Torit® PowerCore® TG Series dust collector is designed for thermally generated dust with a footprint up to 65% smaller than other cartridge collectors.



Packaged Downflo® Evolution

The Packaged Downflo® Evolution (DFEP) combines our industry-leading cartridge technology with an integrated fan and electrical controls — all in an attractive, quiet collector.



Downflo® WorkStation

Specifically designed for areas of dirty and/or noisy operations, the Donaldson Torit® Downflo® Workstation (DWST) applies no restrictions to worker movements or visibility.



Downflo® Oval

The Donaldson Torit® Downflo® Oval (DFO) cartridge dust collector is a compact, high-efficiency unit that uses oval-shaped filters suited for filtering submicron dust.



Dryflo®

The Donaldson Torit® Dryflo® machine-mountable coolant mist collector uses a three-stage filtration process to reduce machining mist to create a safe work environment.



Ambient Collection System

The Donaldson Ambient Collection System is a self-contained, ceiling-mounted dust collector system that utilizes Ultra-Web® cartridge filter technology.



Modular MediaFilter™ Vertical

Donaldson Modular MediaFilter™ Vertical mist collector systems use three-stage filtration to remove air contaminants produced from applications like grinding and wet machining.



WSO

The Donaldson Torit® WSO mist collector system filters water, smoke and oil via Synteq™ XP draining technology resulting in lower pressure drop and longer filter life.

Collecting Confidence

Donaldson's comprehensive dust collection solutions help process owners effectively address their dust, fume, and mist collection challenges by providing knowledgeable guidance, industry-leading equipment as well as unparalleled aftermarket service and support.

With our Consultative, Comprehensive, Connected approach to dust, fume, and mist control, Donaldson is with you every step of the way.



Consultative: Donaldson completes a thorough review with you, listening to your operational needs and challenges.



Comprehensive: With that understanding, we will develop a solution using industry-leading products and technology.



Connected: You will have unrivaled access to global aftermarket specialists, collector performance monitoring, along with service and support professionals providing the answers you need.



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