

Understanding and Mitigating EV Battery Fire Risks

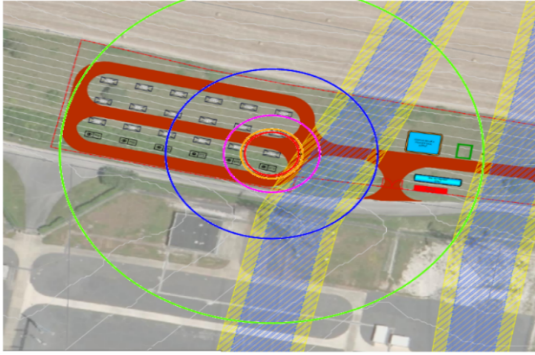
As the electric vehicle (EV) market grows, fire safety concerns linked to lithium-ion (Li-ion) batteries have become more prominent. While these batteries offer high energy density and efficiency, they also pose potential risks.

Recent EV fire incidents have raised alarms, prompting several manufacturers to issue recalls due to flaws in battery design or inadequate ventilation systems. Investigations into EV fire incidents reveal that poor battery design, unclear fast-charging protocols, and insufficient ventilation are key contributors to these hazards.

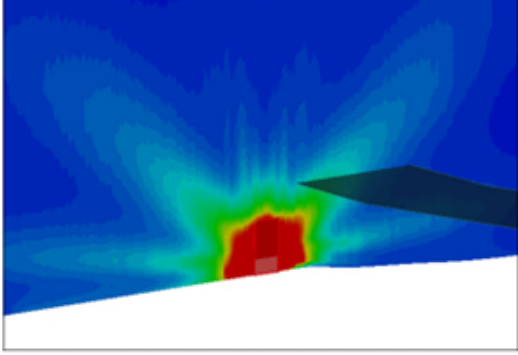


Key causes of EV battery fires include:

- Thermal Runaway** – Overheating causes an exothermic reaction, potentially leading to combustion.
- Internal Short Circuits** – Manufacturing defects or damage cause localized heating and ignition.
- Overcharging/Deep Discharging** – Extreme charging conditions stress battery components.
- External Factors** – High temperatures, shocks, or punctures can compromise battery integrity.



Explosion of battery container in case of accumulation of flammable gases



*Fire in a battery container
Simulation example with Fluidyn*

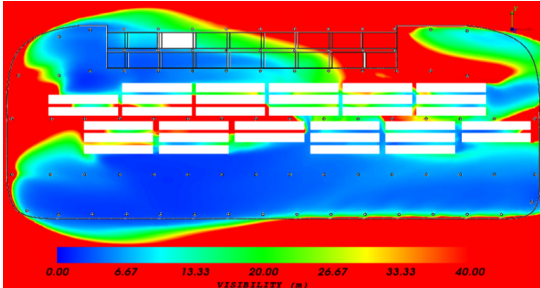
Another major hazard is fire propagation, where a large volume of gas builds up inside or beneath a vehicle-whether a car or a bus before ignition occurs. Once ignited, the intense heat and rapid spread of flames can endanger nearby vehicles and structures, especially in confined spaces like garages or parking areas. To mitigate these risks, improving battery design, cooling systems, and charging guidelines is essential for safe EV adoption.

Battery Fire Simulation with *fluidyn-BFC*

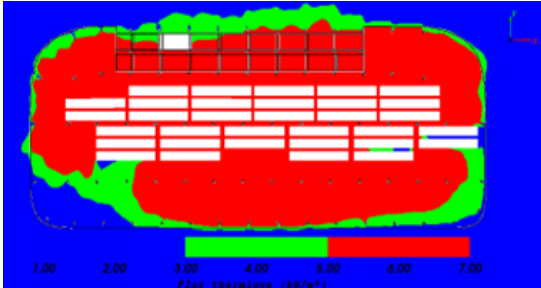
Advanced simulations using *fluidyn-BFC* play a key role in assessing EV battery fire risks by modeling electrolyte flow and electrochemical reactions. These simulations provide insights into gas generation, accumulation, ignition risks within and around battery packs, electrode degradation from improper charging, and fire spread in confined spaces such as garages or parking areas.

Fluidyn software help mitigate battery failures through:

- Optimizing Electrochemistry:** Enhancing ion transmission while minimizing heat.
- Designing Gas & Thermal Ventilation:** Efficient heat dissipation and gas removal to prevent ignition.
- Enhancing Battery Enclosures & Fireproofing:** Improving structural fire resistance.
- Fire Suppression Strategies:** Evaluating suppression methods like emergency ventilation.
- Regulatory Compliance:** Simulating real-world scenarios to ensure safety standards.



Accessibility zones and evacuation – visibility



Accessibility zones & evacuation – heat fluxes

Upcoming events:

[ChemProTech, India](#)

[International Exhibition on Chemical Processing Technology, Equipment & Supplies](#)

📅 **April 29-30, 2025**

📍 **Bombay Exhibition Centre**

Fluidyn is honored to secure a prestigious 30-minute speaker slot at the 14th edition of ChemProTech.

📄 **Speaker Profiles:**

Dr. Amita Tripathi – Technical Director, Fluidyn France

Mr. Nirav Nagadiya – Business Development Manager, Fluidyn India

📄 **Topic of Discussion:**

"Styrene Runaway Polymerization in Storage Tanks: Heating, Leak, and Dispersion Analysis Using 3D CFD Methodology"

Join us for this insightful technical session!



Past events:

[Advanced CFD Workshop](#)

📅 **26th March 2025**

📍 **IIT, Bombay**

Fluidyn, in collaboration with IIT Bombay's Aerospace Department, hosted a free one-day workshop on CFD and Multiphysics software – *fluidyn-MP*. The workshop included training and hands-on sessions, and students who participated received a one-month free software license.

[International Conference on Air Quality Monitoring and Modeling](#)

📅 **19th - 20th March 2025**

📍 **Kumaraguru College of Technology,Tamilnadu, India.**

Fluidyn participated as a keynote speaker at the AQMM conference, presenting:

"Pollutant Source Identification, Pollution Level Forecasting, and Mitigation: Real-Time Solutions Using 3D CFD Modeling."

[3-Day CFD Workshop at Alliance University, Bangalore](#)

📅 **23rd - 25th Jan 2025**

📍 **Alliance University, Bangalore.**

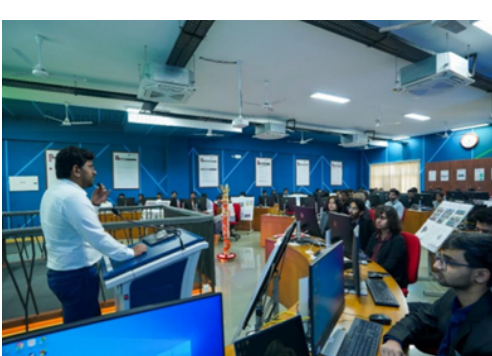
Fluidyn successfully conducted an engaging 3-day hands-on workshop on Computational Fluid Dynamics (CFD) at Alliance University, Bangalore, with the participation of 90+ enthusiastic students!

📄 **Workshop Highlights:**

- 📄 Fundamentals of CFD & governing equations
- 📄 Geometry modeling & meshing techniques
- 📄 Industrial applications: Process optimization, HVAC design
- 📄 Environmental impact assessment, dispersion, fire & explosion modeling

- 📄 Hands-on training with Fluidyn's latest simulation tools

The interactive discussions, Q&A sessions, and project explorations made it an insightful and enriching learning experience for all!



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