



BATTERY PACK CHALLENGES
AND SOLUTIONS FOR
Electrifying Last-Mile Delivery

Smart Batteries, Smarter Deliveries



EXECUTIVE SUMMARY

OEMs and their fleet customers need dependable performance, uptime and profitability in last-mile delivery vehicles that work hard every day. This white paper explores the engineering and operational realities behind last-mile electrification, and the solutions that make it possible.

Readers will learn how to:

- ⚡ **Meet the demands of daily delivery duty cycles where energy, thermal stability and lifespan determine if electrification pays off.**
- ⚡ **Reduce system complexity in new vehicle development through scalable architectures that speed up time to market.**
- ⚡ **Build long-term value with proven reliability and disciplined manufacturing that sustain fleet performance for years.**

Through real-world examples and design insights, you'll see how smarter battery engineering enables OEMs to bring practical, profitable electric last-mile delivery vehicles to market faster — and keep them on the road longer.

INTRODUCTION:

Why Last-Mile Electrification Matters Now

Last-mile delivery is the most expensive, most visible and fastest-growing link in the logistics chain. It's also the least efficient. Every parcel dropped at a doorstep carries the hidden costs of idling engines, short routes and high maintenance.

While “zero-emission” headlines grab attention, electrifying last-mile fleets isn't about publicity. **It's about profitability and reliability!** Fleets that electrify intelligently can cut operating costs, simplify maintenance, and future-proof their business against volatile fuel prices and ever-evolving city access rules.

Major players are making the move:

- ⚡ **Amazon has deployed over 15,000 Rivian electric vans, targeting 100,000 by 2030.**
- ⚡ **FedEx aims for an all-electric pickup and delivery fleet by 2040.**
- ⚡ **USPS plans to have 66,000 battery-electric vehicles by 2028.**
- ⚡ **DHL expects 60% of its fleet to be electric by 2030.**
- ⚡ **Walmart uses around 2,000 electric vehicles from Ford and GM for last-mile deliveries from stores.**

And as parcel volume is projected to reach 30 billion packages by 2030 (Pitney Bowes), smaller and regional carriers are following suit.



Fleet electrification is no longer just a sustainability initiative — it's a business strategy built on uptime, efficiency and total cost of ownership. Success will depend on purpose-built battery systems engineered for performance in demanding, real-world duty cycles.



Reliability

EV drivetrains have 90% fewer moving parts than ICE vehicles, drastically reducing mechanical failures.



Uptime

EV fleets report 10% to 20% higher vehicle availability due to fewer maintenance intervals and overnight charging.



Operating Costs

EVs can cut total operating costs by 25% to 40% through reduced fuel, oil and brake service.



Fuel Stability

Electricity averages 40% to 60% lower cost per mile than diesel, with far less volatility.



Maintenance Costs

Maintenance for EVs averages 30% to 50% lower annually.



Lifecycle Longevity

Well-managed fleet batteries can maintain 80% capacity after 10-12 years of heavy use.

CHALLENGES:

BUMPS IN THE ROAD TO ELECTRIFICATION

The road to electrifying last-mile delivery fleets isn't a straight path. For OEMs designing the next generation of vehicles, and for fleets preparing to adopt them, electrification brings a new set of engineering and operational realities. Understanding these challenges (and addressing them early) is what separates the long-term leaders.

Below, we look at three critical bumps in the road slowing progress, and how they can be overcome through smart battery design and OEM collaboration.



1. HEAVY OPERATIONAL DEMANDS

Delivery vehicles don't rest. They idle in traffic, stop and start hundreds of times per shift, and run 8-12 hours a day — a pattern no consumer EV was built for.

For fleet operators, downtime is the true enemy. A vehicle that can't complete its route costs money every minute it sits.

What last-mile fleets need:

- ⚡ Batteries engineered for long duty cycles and rapid turnarounds.
- ⚡ Predictable range and performance in hot, cold or stop-and-go conditions.
- ⚡ Systems that maintain capacity across years of daily use.

ABS **Proliance** and **Alliance** battery packs are engineered for extended duty cycles and built to perform 8-12 hours per day for 12+ years.

Using advanced battery technology, thermal management and controls, they deliver the consistency and uptime that last-mile operators depend on.



2. SYSTEM COMPLEXITY IN VEHICLE DEVELOPMENT

For OEMs designing next-generation electric delivery vehicles, battery integration is an engineering challenge. Each platform must balance weight, energy, thermal behavior and manufacturability, without driving up cost or development time.

What OEMs need:

- ⚡ **Scalable, configurable battery platforms adaptable across multiple vehicle classes.**
- ⚡ **Seamless electrical and mechanical integration into new chassis designs.**
- ⚡ **Proven technology that shortens validation cycles and reduces program risk.**

ABS collaborates with OEMs from early concept through production. Our architecture and interfaces simplify vehicle integration and reduce complexity. OEMs can scale designs, accelerating time to market with **reliability** and performance **consistency**.



3. PROGRAM RISK AND LONG-TERM VALUE

Last-mile fleet electrification requires significant upfront investment, and OEMs and fleet customers need to be confident that their battery systems will perform predictably and remain supported throughout the vehicles' lifecycles. Concerns about long-term reliability, serviceability and supply stability can slow adoption even when the business case looks strong.

What OEMs and last-mile fleets need:

- ⚡ **Proven, automotive-grade performance data to reduce technical and supply chain risk.**
- ⚡ **Battery platforms engineered for durability and extended service life.**
- ⚡ **A battery pack partner with the financial and manufacturing stability to stand behind the product for the long term.**

ABS provides the engineering rigor and manufacturing discipline needed. Our IATF-certified, U.S.A.-based facilities; experienced teams; and strong supply chain ensure performance, quality and long-term support. With a proven track record and the financial strength to support future generations, ABS gives customers confidence that their electrification investment will endure.



THE ABS ADVANTAGE:

DESIGNED FOR REAL-WORLD RELIABILITY

Every day in last-mile delivery is a stress test. Long hours, heavy payloads and constant cycling demand batteries that perform like workhorses.

Fleets need battery packs designed and validated to the highest standards, with every detail engineered for uptime and longevity.

BUILT FOR UPTIME

Reliability starts with design discipline. American Battery Solutions battery packs meet the same rigorous performance and safety standards required by the world's leading vehicle OEMs. From enclosure sealing to thermal management and system diagnostics, every feature is engineered for real-world duty cycles, so fleets can run longer with fewer unplanned service interruptions.

SCALABLE ARCHITECTURE

Electrification should simplify, not complicate, vehicle development. ABS battery platforms are modular and configurable, allowing OEMs to use a common system architecture across multiple vehicle models and energy capacities. That consistency shortens engineering timelines, reduces supply-chain complexity and enables easier service.

DATA-DRIVEN DURABILITY

Through continuous testing and field feedback, ABS refines battery control algorithms and thermal strategies to maximize usable life. Integrated diagnostics help OEMs and fleet operators monitor system health and plan maintenance proactively, protecting uptime and residual value over years of service.

PROVEN IN THE REAL WORLD

ABS partners with OEMs from the earliest stages of vehicle development to align system performance with duty-cycle requirements. In one recent engagement, a customer initially specified a 110 kWh pack. After ABS analyzed real-world drive-cycle data, engineers developed a smaller, lighter system that met all range and power requirements, lowering total system cost while improving efficiency and utilization.

CONCLUSION: ELECTRIFY INTELLIGENTLY

The path to electrifying last-mile delivery is as much about smart engineering as it is about ambition. OEMs face complex trade-offs in vehicle design, lifecycle economics and manufacturing timelines. And the choices made today can define performance for the next decade!

Success comes from collaboration early in the process: Aligning duty-cycle data, platform architecture and validation standards for solutions that deliver reliable range, uptime and longevity.

At American Battery Solutions, our focus is on enabling that success, applying proven engineering, disciplined manufacturing and long-term partnership to help OEMs bring dependable electric vehicles to market faster.

Because in the race to electrify the last mile, the winners will be the ones who stay on the road the longest.



ABS is your partner to power what moves tomorrow.

Learn more: americanbatterysolutions.com

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