

CASE STUDY

THERMOPLASTIC E-BUS BATTERY PACK HOUSING PIONEERING SAFETY & SUSTAINABILITY

BACKGROUND & CHALLENGE

Electric buses (E-buses) are key to sustainable urban mobility, but their battery pack enclosures must balance safety, weight, and cost efficiency. Traditional metal enclosures with thermal blankets add weight and complexity while limiting design flexibility. The challenge was to develop a safer and more efficient battery housing solution without compromising thermal and electrical insulation standards.

INNOVATION & DIFFERENTIATION

The thermoplastic battery enclosure solution — developed by Bluebus, SABIC, and systems supplier SIMONA — delivers multiple advantages over traditional metal-based solutions:

- **Enhanced passenger safety**, ensuring quick evacuation in emergencies
- **Easier retrofitting**, enabling seamless adaptation to existing battery pack designs
- **Outstanding fire resistance** with a non-halogenated flame-retardant PP material with intumescent properties
- **Improved thermal and electrical insulation** compared to metal enclosures



SOLUTION

In a breakthrough innovation, the bluebus electric bus adopted a flame-retardant (FR) thermoplastic composite solution (FR LGF-PP: STAMAX™ 30YH611 long glass fiber polypropylene resin) for use in its battery enclosure. This globally first-of-its-kind thermoplastic solution includes:

- **Bottom platform:** 4mm extruded STAMAX sheet + wood structure
- **Lateral housing & top cover:** 4mm extruded STAMAX sheet + wood structure + 0.8mm steel

This innovative thermoplastic enclosure achieves one of the highest kilograms of plastic per vehicle (KPV) ever recorded in an EV battery housing.

PROCESS & IMPLEMENTATION

The development process focused on optimizing material selection, processing, and safety validation:

1. **Material Development & Selection** — Chose STAMAX FR 30YH611 for its high strength, fire resistance, and lightweight properties
2. **Flame & Thermal Testing** — Conducted rigorous fire tests at temperatures far exceeding 1200°C, demonstrating excellent cold-side temperature reduction compared to traditional thermoset materials
3. **Production & Integration** — Designed for seamless adaptation to existing battery enclosures, easing mass production and retrofitting

RESULTS & IMPACT

The adoption of thermoplastic battery enclosures in the Bbluebus platform has delivered:

- **Improved safety performance**, outperforming traditional metal solutions in fire resistance
- **Scalability**, with potential for broader applications across various EV platforms

WHAT'S NEXT

This industry-first thermoplastic battery enclosure sets a new benchmark for EV safety, performance, and sustainability. With increasing global demand for lightweight, fire-resistant materials in electric buses and commercial EVs, this innovation is poised for widespread adoption across multiple OEMs.



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