Q-Wave SpeedNFORCE - Case Study

Dynamic Speed-Control Zones for a Global Aerospace Manufacturer

1. Background

A leading global aerospace firm operates a 600-acre campus that includes a 1-million-square-foot manufacturing hall and dozens of auxiliary buildings. Around 200 electric golf carts move engineers, technicians, and material handlers between workstations, storage areas, and offices. Inside the massive hall, pedestrian traffic is dense; outdoors, carts travel long distances at full speed.

Although the fleet had not caused any serious injuries, the plant's collective-bargaining agreement permits any employee who observes unsafe vehicle behavior to halt production for an investigation. Frequent near-misses therefore resulted in repeated, costly shutdowns. The client needed a way to automatically enforce a lower speed inside the building while preserving full speed on outdoor routes, and the solution had to work across a heterogeneous fleet of more than ten cart brands—some of which lacked complete wiring documentation.

2. Business Challenge

- Issue/Impact: Uniform speed setting, Drivers often forgot to reduce throttle when entering the hall, creating collision risks.
- Manual controls ineffective: Signage and driver discipline proved insufficient; each near-miss triggered a production stop.
- Fleet diversity: Different motor controllers, wiring harnesses, and undocumented legacy models complicated a one-size-fits-all retrofit.
- Operational demand: Outdoor travel must stay at full cart speed to meet tight material-flow schedules.

The desired outcome was an automatic, zone-aware speed limit that could be deployed quickly and reliably across the entire fleet.

3. The Solution - Quarion's SpeedNFORCE, a two-part system:

1. Zone-definition beacons – 120v A/C inward facing and outward facing directional transmitter modules mounted at each overhead door. Each beacon broadcasts a unique ID and a zone flag (INDOOR vs. OUTDOOR). Overlapping coverage creates a clean boundary at the building threshold.
2. Vehicle-mounted speed-control module – A compact controller installed on each cart. It receives the beacon signal, identifies the active zone, and throttles the motor to a preset ceiling. For the pilot the indoor limit was set to 25 % of each cart's maximum speed; outdoors the cart runs at 100 %.

The module includes interchangeable wiring adapters for each cart brand. For legacy models lacking schematics, Quarion engineers reverse-engineered the motor-controller inputs on a bench, then validated the wiring in the field.

Safety-first logic: If beacon contact is lost, the module defaults to speed controller's low speed limit, ensuring the cart never exceeds a safe threshold.

QUARION'S PLATFORMS

Zone Based Speed Control

AI-Vision Based Collision Avoidance

Indoor GPS Precision Control Data Collection

PLATFORM POSITIONING

- Safety Optimization
- Operational Optimization
- Fleet Optimization
- H/R & Risk Optimization

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4. Implementation

The pilot focused on the 100 most heavily used carts and was completed in eight weeks:
Quarion engineers worked alongside the plant's maintenance crew, ensuring knowledge transfer and rapid issue resolution.

5. Results

Safety

- Near-miss incidents fell from an average of 4.2 per month (pre-deployment) to 0.3 per month in the first three months—a 93 % reduction.
- No facility shutdowns were triggered by cart-related safety concerns during the six-month post-implementation window.

Operational Efficiency

- Outdoor travel times remained unchanged, preserving material-flow schedules.
- Drivers no longer needed to remember manual speed adjustments, freeing mental bandwidth for routing decisions.

Financial Impact

- Estimated $150 k saved annually by avoiding lost production hours linked to shutdowns.
- Retrofit cost averaged $850 per cart (total ≈ $85 k), yielding a payback period of ≈ 7 months.

Strategic Gains

- The customer signed an agreement with its primary golf-cart vendor to ship all future carts pre-installed with the Quarion module, eliminating future retrofit expenses and guaranteeing consistent safety.
- Dashboard analytics highlighted peak indoor traffic windows, enabling the plant to stagger shift changes and further reduce congestion.

6. **Customer Feedback**

"Quarion gave us an automated way to protect our workforce without sacrificing mobility. The system works flawlessly across our mixed-model fleet, and having the vendor install the device factory-ready is a game-changer. Since go-live we've seen a dramatic drop in near-misses and zero production stops related to cart safety."
— Senior Safety Manager, Global Aerospace Manufacturer

7. Lessons Learned

- Modular wiring adapters made it possible to service ten-plus cart brands without redesigning the core module.
- Redundant beacons ensured a reliable zone boundary even if a single transmitter failed.
- Fail-safe default speeds protected against occasional RF interference or beacon loss.
- Early driver involvement—explaining LED status lights and safety rationale—accelerated acceptance and proper use.

8. Conclusion

By pairing geofencing beacons with on-board speed-control modules, Quarion delivered a zone-aware speed-limit system that eliminated near-miss incidents, prevented costly production shutdowns, and preserved full outdoor efficiency. The solution proved adaptable across a heterogeneous fleet—including legacy carts lacking documentation—and achieved a rapid financial payback.

The partnership's success has already shaped the client's procurement strategy: future golf carts will arrive factory-installed with Quarion technology, embedding safety at the point of manufacture and scaling the benefit campus-wide. For organizations confronting similar challenges of mixed vehicle fleets, dense pedestrian traffic, and the need for zone-specific speed regulation, Quarion offers a proven, scalable platform that blends geofencing, on-board control, and cloud analytics into a single, easy-to-manage solution.

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