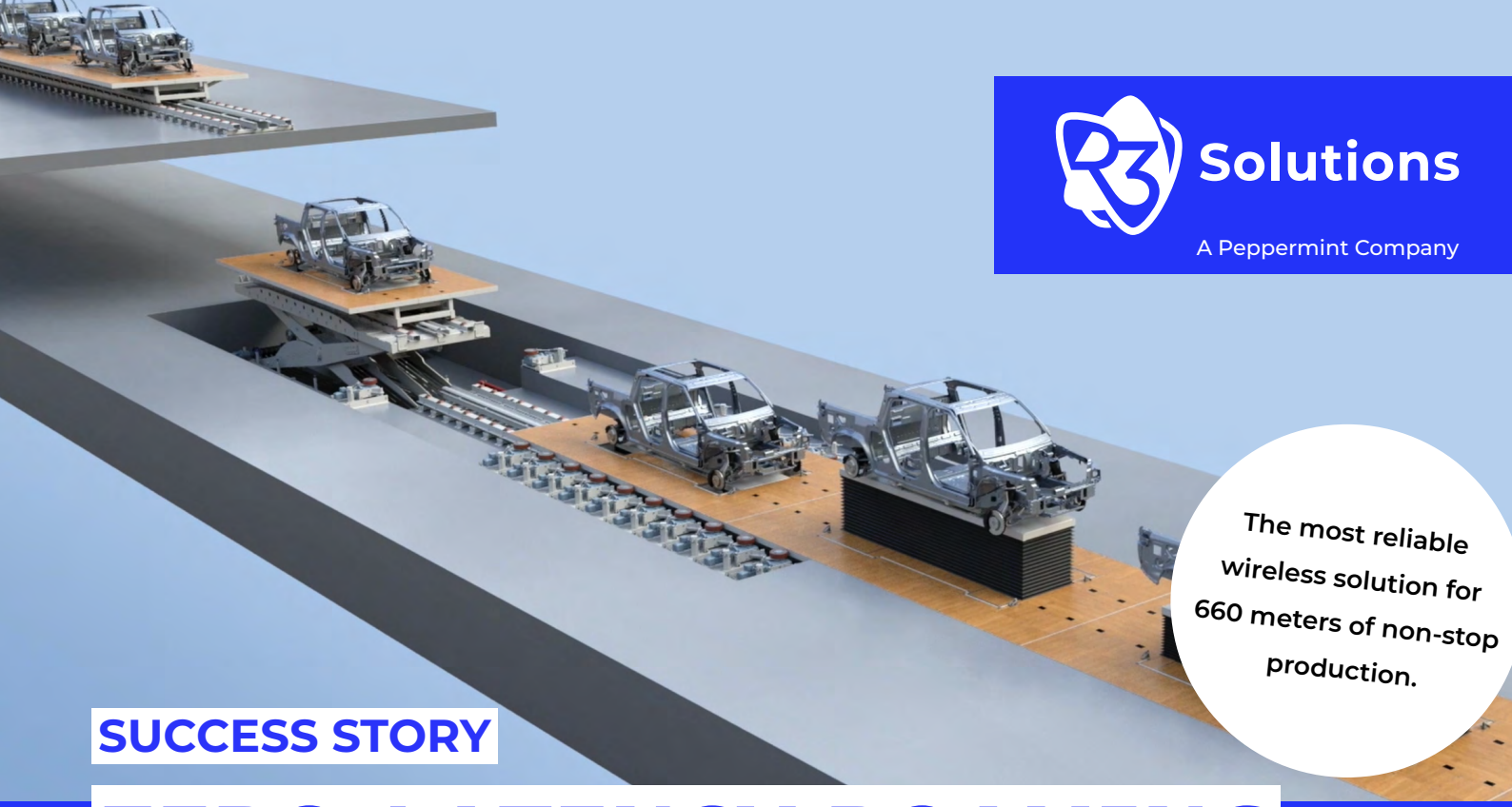

R3 Solutions
A Peppermint Company

The most reliable wireless solution for 660 meters of non-stop production.

SUCCESS STORY

ZERO-LATENCY ROAMING ON THE ASSEMBLY LINE

AUTOMOTIVE MANUFACTURING PROJECT

In automotive manufacturing, battery-powered skillets flexibly transport vehicle bodies over lifters along large assembly lines. Mobile workstations on each skillet must maintain a continuous, fail-safe wireless connection to the central PLC at all times — across the full 660 meters of the production line.

BUSINESS IMPACT

CAPEX

Scope: Uninterrupted skillet control (No production downtime)

Cost: Efficient installation through meticulous planning (reduced deployment time)

OPEX

Running: Reliable real-time control in operation since 2021 (Zero failures since launch)

Maintenance: Easy to maintain (no material wear on wireless components)

TECHNICAL DETAILS

Network size:	124 devices
Real-time protocol:	LJU UDP BBH DSI
Other traffic:	TCP/IP
PLC cycle time:	50 ms
Safety cycle time:	96 ms
Coverage:	660 m (2165 ft)
Roaming:	seamless (real-time control)
Monitoring:	No

CUSTOMER
U.S. automobile manufacturer

PARTNER
Conductix-Wampfler, DACS und LESCO

LOCATION
Illinois, United States

CATEGORY
Automotive, Industrial Automation

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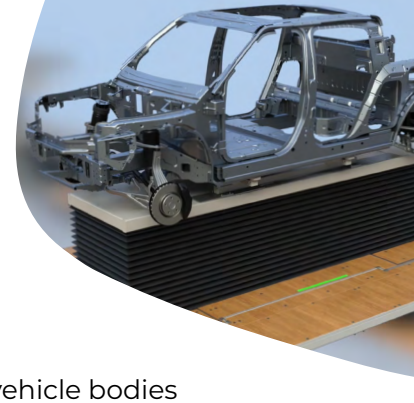
SUCCESS STORY

Zero-Latency Roaming on the Assembly Line



TASK

Autonomous, battery-powered skillet vehicles transport vehicle bodies along a 660-meter assembly line. Each skillet carries a mobile workstation that must maintain a permanent, fail-safe wireless connection to the central PLC. A physical cable connection was not feasible given the line length, skillet lifters and vehicle mobility. Wireless connectivity was therefore a prerequisite for the new greenfield installation.

SPECIFICATIONS

More than 80 battery-powered skillets had to be integrated into a 660-meter conveyor system. The wireless solution supports three data streams simultaneously: BBH DSI safety data (96 ms safety cycle), LJU UDP control data (50 ms control cycle), and non-time-critical TCP/IP traffic.
Seamless roaming with uninterrupted real-time control across the entire production line was mandatory. Low power consumption was required to avoid recharging interruptions.

IMPLEMENTATION

R3 Solutions planned and deployed the wireless infrastructure for this greenfield installation. The solution is based on EchoRing technology, enabling low-latency, highly available communication between each skillet and the central PLC.
124 Bridge E devices were deployed. One per skillet plus additional infrastructure nodes distributed along the track. EchoRing's deterministic token-ring architecture ensures that if a single node fails, a nearby device takes over immediately with a pre-calculable maximum latency.

CHALLENGES

Maintaining a deterministic 50 ms control cycle and a 96 ms safety cycle across roaming boundaries was the core technical challenge. Alternative wireless technologies were evaluated and ruled out because they could not guarantee the required reliability and fail-safe performance. EchoRing's resource reservation mechanism proved decisive, enabling seamless subnet handover without interrupting real-time control. Low-power operation on board the skillets was an additional constraint, addressed by EchoRing's efficient wireless profile.

RESULTS

Installation was completed swiftly and efficiently thanks to thorough pre-planning. The system has been in continuous operation since fall 2021 with zero failures. Maintenance is minimal (no cables to install or replace, no mechanical wear). The wireless architecture also supports future production layout changes without structural modifications. The project now serves as a blueprint for further installations, including monorail systems with
up to 300 vehicles and 5 kilometers of track.

HARDWARE

124 Bridge E devices with Echo-Ring technology; central master PLC; dedicated safety PLC on each skillet vehicle.

SERVICES

Network concept development and **wireless deployment planning** for a greenfield production environment — including system design, on-site commissioning **support**, and **integration testing**.

CONDUCTIX wampfler

„A truly cutting-edge solution: a fully wireless skillet system using radio communication and battery-powered technology instead of traditional busbar or inductive systems. The ability of this technology to transmit critical safety signals wirelessly with the responsiveness and reliability of a wired system is remarkable. "

Rafael Orozco, Supervisor, Mechatronics Field Service at Conductix-Wampfler

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