

The 2026 Charging Playbook

How to Keep Your AMRs and AGVs Moving 24/7



Supporting a New Era of Intralogistics

Autonomous mobile robots (AMRs), automated guided vehicles (AGVs), and collaborative robots are transforming the way manufacturing, logistics, and material handling industries operate. Facilities that once relied on static automation are now embracing flexible, mobile systems capable of consistent production and intralogistics support.

But even the most advanced robot cannot move without reliable power. As fleets grow and diversify, charging infrastructure has become a critical part of system design and planning. A well-engineered charging strategy can dramatically increase uptime, improve fleet utilization, and extend robot battery life, while poor design can create bottlenecks that limit efficiency and profitability.

The next evolution of automation depends not just on smarter robots, but on smarter power delivery. This playbook by [Conductix-Wampfler](#) guides engineers, operations leaders, and OEMs through the key actions needed to keep AMRs and AGVs moving 24/7. From understanding evolving automation trends to designing scalable systems and more, each section outlines practical steps you can take to optimize uptime, efficiency, and long-term ROI.



One

Recognize How Automation is Evolving

The rise of Industry 4.0 created a demand for automation that is intelligent, mobile, and always available. In 2026, AMRs and AGVs will no longer be experimental technologies found in isolated test environments. They will more quickly become standard equipment across factories, distribution centers, and production lines.

[Recent market data](#) shows that the global AMR market exceeded USD 4 billion in 2024 and is on track to reach nearly USD 10 billion by 2030. Combined with AGVs, the overall mobile robotics sector is expected to grow more than 9% annually through the next decade. As production demands increase, facilities are deploying mixed fleets composed of vehicles from multiple manufacturers, each with different energy needs and communication protocols.

The shift toward mixed fleets has introduced new challenges:

- Each vendor may use a different charging interface, connector, or software control system.
- Chargers are often underutilized or incompatible across fleets.
- Maintenance requirements and communication standards vary widely.

Interoperability has quickly become a top engineering priority. In response, several global standards are emerging to create common ground between OEMs, system integrators, and end users. VDA 5050, developed in Germany, defines a standardized communication interface between AGVs, AMRs, and fleet management systems – allowing vehicles from different manufacturers to operate together within the same environment. Similarly, ISO 21423 establishes guidance for AGV communication and control architecture, helping align global expectations for interoperability, safety, and performance.

As these standards gain adoption, more customers are requesting systems that are compliant or compatible with them. For engineering teams, this means designing charging and communication infrastructure that can plug into these evolving frameworks without major rework. Facilities that plan for open communication protocols, standardized charging interfaces, and scalable energy infrastructure today will be best positioned to adapt as automation density continues to grow.

Two

Plan Charging for Maximum Uptime

To maintain continuous operation, engineers must begin with a clear understanding of how charging affects throughput and fleet availability. The key factors are battery capacity, power consumption, duty cycles, and dwell times. These data points inform the number of chargers required, their placement, and the distribution of energy throughout the facility.

Electrical engineers also need to consider upstream power requirements. As charging infrastructure expands, total current draw and load balancing across circuits become essential design considerations. Integrating smart power management systems that communicate with facility energy controls helps prevent overloads and support sustainability goals.

For OEMs and robotics manufacturers, modular charging architectures are increasingly important. Designing vehicles to accept standardized charging modules enables flexibility across deployments and simplifies compliance with local or regional power standards.



Three

Explore Conductive & Inductive Options

Today's automation environment relies primarily on two charging methods: conductive and inductive. Both have distinct advantages depending on the application.

Conductive Charging

Conductive systems use physical contact between the charger and the vehicle to transfer power. These systems are efficient, compact, and cost-effective. They typically achieve charge efficiencies of more than 95% and can deliver high current levels up to several hundred amps. Conductive charging remains the preferred choice for high-throughput operations where vehicles can dock for short, planned intervals.

Inductive (Wireless) Charging

Inductive, or wireless, charging is increasingly popular in facilities targeting full automation. These systems transfer power through electromagnetic fields, eliminating physical connectors and minimizing wear. Although slightly less efficient than conductive charging, modern systems offer major advantages in safety, cleanliness, and flexibility.

Hybrid deployments that combine conductive and inductive charging are becoming more common, especially in large-scale or multi-shift operations. Conductive docks can provide fast charging during scheduled stops, while embedded inductive pads allow vehicles to top off opportunistically as they pass through work zones.



Conductive



Inductive

Four

Integrate Charging Into Facility Controls

Charging cannot operate in isolation. Modern systems rely on seamless integration with vehicle controllers, fleet management platforms, and facility automation systems.

Engineers are increasingly adopting open communication standards such as OPC UA, Profinet, and Modbus TCP to unify these systems. Chargers must share data on power levels, availability, and fault conditions in real time. Predictive maintenance algorithms depend on this data to identify patterns of degradation and schedule interventions before failures occur.

Five

Collaborate Early with Vehicle Manufacturers

For OEMs developing AGVs, AMRs, or cobots, integrating charging systems early in the design phase is essential. Partnerships with charging technology providers can streamline vehicle design, ensure compliance with relevant standards, and facilitate certification testing for global markets. Modular charging solutions allow OEMs to shorten development cycles, reduce field testing risk, and provide flexible energy options across product lines.

Six

Ensure Safe & Resilient Charging

Safety and cybersecurity go hand and hand with system reliability. In mixed environments where humans and robots work side by side, charging systems must be safe to operate and resilient against failure. Key safety considerations include short-circuit protection, temperature monitoring, emergency shutdown capability, and clear status indicators.

Cybersecurity is critical as chargers communicate through industrial networks. Standards such as the EU Cybersecurity Resilience Act and IEC 62443 provide guidance for securing communication channels and authenticating data exchanges. Operational resilience also depends on redundancy – multi-zone layouts, backup stations, and embedded monitoring help ensure uptime during maintenance or unexpected events.

Seven

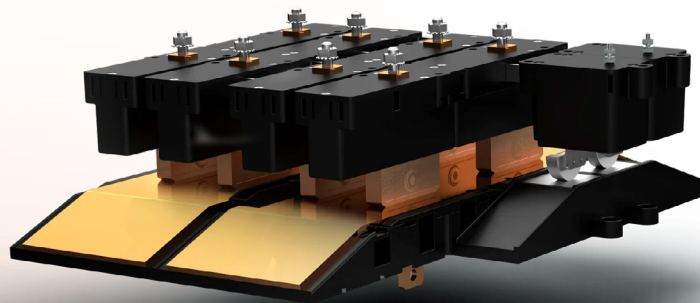
Track Metrics to Optimize Efficiency

Understanding how your charging infrastructure performs in real time is key to keeping fleets moving at peak efficiency. Rather than simply counting charge cycles or noting battery health, engineers and facility managers can use this data to make proactive decisions that maximize uptime and extend battery life.

In a busy distribution center where dozens of AGVs and AMRs operate continuously, a lack of visibility can lead to vehicles waiting unnecessarily for available chargers or charging too frequently, which reduces battery longevity. By tracking metrics like system availability, charge cycle time, power throughput, and energy efficiency, teams can uncover patterns, prevent bottlenecks, and optimize schedules to keep operations running smoothly.

Battery health indicators, like cycle count and depth of discharge, reveal when a vehicle may require preventive maintenance, helping to avoid unexpected downtime. Similarly, monitoring charger utilization ensures energy infrastructure is used effectively and that expensive equipment is not sitting idle.

Over time, this data becomes a feedback loop. Engineers can test adjustments, forecast energy needs, and refine charging strategies before problems occur.



Eight

Anticipate the Next Generation of Charging

The way we think about charging infrastructure is evolving. By 2026 and beyond, it will no longer be a set of isolated stations scattered across a warehouse. Instead, it will be a fully integrated part of the industrial energy ecosystem, intelligently supporting fleets that never stop moving.

Interoperability will become a baseline expectation. Open communication standards and universal charging protocols will ensure that mixed fleets from different manufacturers can operate together without friction. Engineers will design facilities knowing that any vehicle can dock, charge, and return to work with minimal intervention.

Sustainability will also be a guiding force. Charging systems will increasingly integrate with grid management, capturing excess energy when available and minimizing peak demand. Facilities may even recover energy from braking or idle vehicles, feeding it back into the system to reduce costs and carbon footprint.

Finally, data-driven optimization will transform how charging is managed. AI and digital twins will allow engineers to simulate fleet operations and adjust charging strategies in real time. Instead of reacting to downtime or energy shortages, facilities will anticipate them, creating an environment where productivity and efficiency continuously improve. In short, the next generation of charging infrastructure will be smarter, faster, and more adaptable than anything today.

Nine

Leverage Advanced Solutions

Conductix-Wampfler provides the technology and expertise to power continuous, safe fleet operation. Our portfolio of solutions includes:

[Nano+](#): Compact charging for small and mid-size AGVs and AMRs, designed for easy OEM integration

[Enduro+](#): High-current conductive charging built for rugged, heavy-duty operations

[Chargeline 0865](#): Modular conductive interface ideal for diverse or mixed fleets

[Wireless Charger 3.0](#): Contactless, maintenance-free inductive system with integrated communication and diagnostic features

[Jay RadioSafe](#): SIL 3- Ple -rated safety control for emergency fleet management and isolation

Conductix-Wampfler works closely with OEMs, integrators, and end users to develop tailored charging infrastructure that meets specific operational goals. Partnering for foresight, integration, and trusted collaboration allows engineers and operators to keep fleets moving efficiently, safely, and continuously.

Make sure your business is prepared for 2026. To learn more about our suite of proven charging solutions, visit our [landing page](#) or [get in touch today](#).

