



Boosting innovation: The technology advances driving the automotive industry forward

Harnessing AI, robotics and automation for competitive advantage in the revolutionary automotive and autonomous driving market



Foreword

Waves of change are hitting the automotive manufacturing industry from all directions.

A generational revolution is shifting production from combustion engines to electric vehicles. Consumer demand is morphing what was purely a mode of transport into a 'computer on wheels' entertainment experience. Advances in autonomous driving are redefining the entire vehicle purchasing and ownership landscape. And AI, automation and robotics are transforming the production environment.

Change on this scale brings risk but also the potential for incredible success. In many cases, the automotive manufacturer that embraces and leverages the change rapidly and decisively will seize a valuable competitive advantage.

However, in a physically and virtually fragmented operating environment dominated by innovative technologies, success for these automotive companies will depend on implementing a blend of intelligent, secure and cloud-centric network solutions.

As a global business, we collaborate with industry leaders worldwide, including many international automotive companies like yours. In this whitepaper, we've combined these global industrial insights with our deep expertise in leveraging innovative technologies to explore how you could best exploit the changes reshaping automotive operations.

Ready to explore the possibilities? Get in touch with us today.

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Scope out the opportunities created by innovative technologies in automation

The automotive industry is on the brink of significant transformation driven by technological advancements, regulatory changes and evolving consumer preferences. These changes hold massive potential for automotive companies to set themselves up for a brilliant and profitable future.

Here we outline the most exciting opportunities.

Take early advantage of the transition to Electric Vehicles (EVs)

The development of any new technology offers companies an opportunity to seize advantage by adapting to change early, and the rise of EVs is no exception. The impacts of electrification in the automotive sector will spread far wider than EV manufacturing.

Potentially, supply chains will need to pivot from a set up customised to producing internal combustion engines to one that covers all the inputs necessary to manufacture EVs, including batteries and electric engines. This is a prime opportunity to construct an efficient, optimised supply chain, purchasing from innovative businesses offering the latest technological advances. Combining this reimagining of the supply chain with a sustainable focus on sourcing raw materials will also grow the automotive company's eco-credentials.

As EV take-up increases, the charging network will likely grow in importance, and its model will evolve. Today, the EV driver decides when and where to charge, but in the near future, intelligent vehicle systems may suggest and select the best charging options based on factors such as range, planned trips and convenience. Delivering a winning strategy on vehicle intelligence and charging station agreements will be crucial for automotive manufacturers to differentiate themselves in the competitive market.



The International Energy Agency projects that by

2035,

more than one in four vehicles on the road will be electric.

Build on consumer demand for tech-loaded vehicles

Today's vehicles powered by electricity or combustion engines are increasingly packed with technology features designed to entertain and reduce the user's input into driving; these vehicles are often described as 'computers or robots on wheels'. While waiting for regulatory approvals on autonomous driving, supervised and unsupervised, drivers want enhanced safety features and options to relieve the responsibility and tedium involved with driving, such as cruise control that adapts to changing speed limits, automatic braking and blind spot monitoring. They also want cars to look after themselves, with remote engine health monitoring and proactive issue management.

And passengers want to be comfortable and entertained with a full range of audio, visual, streaming and connectivity options.

Many of these advanced features depend upon 'connected car' technology, which constantly links the vehicle's software with a cloud-based intelligence and control centre. Thanks to flexible, multimodal, ultra-reliable, low-latency network architecture, an automotive company can capitalise on the value of data by approaching multiple edges and clouds as a unified intelligence.

This shifts the manufacturer's focus from pure product attributes to delivering an experience that's not limited to the car's physical border. Its digital foundation becomes essential to delivering today's high-quality, innovative car user experiences.

More than **90%** of vehicles sold in 2030 will be connected, up from **50%** in 2024.



Stake an early claim in the autonomous market

Autonomous driving is only a few steps further along this 'computers on wheels' development path; human-supervised automated driving projects are well underway in the US and China, and it's expected that one leading automotive company will launch a robotaxi pilot project to offer 'autonomous ride-hailing for money' in Austin, Texas imminently, that will do away with human supervision.

Such autonomous driving projects' success depends on their centralised, cloud-hosted algorithms, which process vast amounts of sensor data, make real-time decisions and optimise vehicle control. The speed at which such algorithms can learn, improve and quantify their success - particularly in terms of safety - may accelerate the global acceptance of autonomous driving projects. Potentially, once one region has established regulations permitting autonomous driving, others will quickly follow. This could mean that the gap between the early adopter nations of the US and China and take-up in other regions, including South America, Japan, Europe and Australia, will close rapidly.

The opportunities for automotive companies that get in on the ground floor of this revolution are immense.



The global robotaxi vehicle market value in 2045 will be **US\$174 billion**, growing with a 20-year CAGR of **37%** between 2025 and 2045.

Secure valuable production efficiency gains with AI, robotics and automation

Seizing a competitive advantage while the market adapts to the disruptions of EVs and autonomous driving must involve optimising production efficiency and costs. Automotive production lines must evolve to deliver new specifications effectively.

Introducing AI-powered machine learning models into production lines makes predictive maintenance possible. These models analyse real-time sensor data to predict equipment failures and schedule maintenance to prevent expensive and disruptive unplanned shutdowns. Predictive maintenance cuts costs on many fronts, reducing unnecessary routine servicing and keeping machines in optimal order for maximum efficiency and increased lifespan. It also identifies inefficient machines that consume more energy than necessary so companies can deliver fast adjustments to address this.

AI-driven autonomous robots and collaborative robots (cobots) have enormous potential to eliminate human fallibility in the production line and to remove humans from risky environments altogether. Robotic Process Automation (RPA) systems can work day and night with high levels of precision and consistency, robotic vision systems can detect quality defects faster than humans and reprogrammable robotic arms can rapidly adapt to production changes without significant reconfiguration costs.

Make significant strides in sustainability and circular economy terms

Global leaders, stakeholders and consumers support the green transition. Public awareness of the importance of sustainability is at an all-time high as citizens are exposed to extreme weather and natural disasters. They welcome policy advances such as the [UN's sustainable development goals](#), which include substantially increasing the share of renewable energy in the global energy mix. In response to this regulatory environment, consumer ambitions and investor influence, [in 2024, 70% of business leaders said sustainability would greatly impact their strategy and operations over the next three years](#).

Automotive manufacturers must be ready with products and strategies to support consumers towards greener transportation with EVs. Despite medium-term difficulties in mass affordability and green-energy availability, consumers accept that EVs are inevitable. Given this, automotive companies need to enhance the sustainability of their products by combining greener production methods with a circular economy approach to EV batteries.

When [EV batteries reach the end of life](#), consumers expect effective pathways to be ready to reclaim and reuse materials from them. This is a complex process involving disassembly, careful material separation and recovery. However, automotive manufacturers developing these pathways now will have a much stronger and more compelling eco story to take to market.

Robotic systems are estimated to boost productivity by up to

30% and reduce workplace accidents

by up to 70%.



In 2035, recycled material may account for

up to 30% of lithium, nickel and cobalt demand for battery cell production.



The challenges automotive manufacturers must overcome

The evolving automotive environment presents significant opportunities, but in such a dynamic market, automotive companies must understand and be ready to mitigate any potential challenges. Here, we outline what aspects companies should factor into their strategies.

Remaining competitive with new market entrants

Digital transformation is essential for automotive manufacturers looking to compete with EV-native brands and low-cost new entrants. Without digital transformation to help maintain affordability and profitability, automotive companies will struggle to remain competitive in an industry where cost, speed and sustainability are critical differentiators. Digitalising their supply chain and production will allow them to match the agility start-ups get from digital-first operations, streamlined logistics and advanced automation.

By integrating smart manufacturing, AI-driven demand forecasting and real-time supply chain visibility, automotive manufacturers can minimise waste, optimise production and respond faster to market shifts.

By 2028,
demand for
product
innovation
will drive

50%
of large
manufacturers
to use
generative AI
to identify new
opportunities
for enhancing
legacy products.

Cyber security ready to protect any advances

Automotive manufacturers' cyber security must protect every aspect of data transfer between the cloud-based systems involved in the intensely interconnected world of vehicles and automated driving. These defences, stretching across the business, supply chain and vehicles, must be sufficiently resilient to inspire consumer trust and sufficiently responsive to allow manufacturers to design software without constraint.

Central to this will be round-the-clock monitoring of the automotive company's entire estate to identify and mitigate any cyber attacks as soon as they appear on the horizon. AI-powered automated defences will help security teams assess the significant volumes of data involved to pinpoint threats requiring specific expert attention.

Edge security will be critical to protecting onboard car systems from hacks that could override the driver's control. This must include regular and strenuous penetration testing carried out by experienced ethical hackers to identify and resolve any vulnerabilities before they can be exploited.

In 2024,
43%
of deep and
dark web cyber
activities had
the potential to
impact thousands
to millions of
mobility assets.



Granular visibility to ensure compliance and intelligent decision-making

With global supply chains and markets, automotive manufacturers are subject to a complex net of regional regulations around carbon emissions and sustainability targets. Generally, they face pressure to lower the carbon impact of their manufacturing processes and vehicles.

Central to this is the ability to make rapid, intelligent supply-chain decisions to secure the raw materials and parts required in the most cost-effective and sustainable way possible. These supply chains must be ultra-resilient and flexible to operate effectively in a world disrupted by geopolitical instability and tariffs.

Comprehensive visibility at a granular level is essential. Businesses can't measure and optimise what they can't see, so they must bring data from systems fragmented across the organisation and supply chain into a single pane of glass view.

From a compliance stance, they can then ensure operations follow regional regulations, such as those governing data sovereignty.

Then, by creating a digital twin of their operations, companies can test different supply chain configurations, run risk simulation scenarios, optimise network configurations and cloud orchestrations to minimise energy use and collaborate effectively and remotely with developmental partners. This is particularly valuable for automotive manufacturers delivering different regional vehicle configurations.

2024 saw a
37%
increase YoY
in global
automotive
supply chain
disruptions.

Creating outstanding buying experiences in a new sales model

As the automotive market sales model evolves, manufacturers need to be able to deliver exceptional omnichannel buying and post-sales experiences in different contexts. Those moving towards online and direct-to-consumer sales models require a strong centralised digital infrastructure. In contrast, those adopting a model of brand-owned outlets need enhanced technological capabilities at the edge to deliver high-quality, personalised experiences across a network of stores.

At the core of both these approaches is the ability to orchestrate and integrate data from a wide range of sources into a 360° view of the customer, including their location on the purchase pathway.

For this, the automotive company will use reliable, fast connectivity solutions and a strong and stable cloud-centric network to support a mix of software platforms, real-time data analytics and AI tools.

These layered-on technologies will make each customer interaction a live entity generating feedback that informs real-time adjustments and predictions. The company will also be able to add technologies to enhance customers' experiences at key points, such as in-store dynamic digital displays that are personalised as the customer approaches, offering live video appointments with engineers to troubleshoot vehicle issues or using augmented reality on the customer's smartphone to reveal new functionalities on their vehicle.

In 2024,
30%
of consumers
planned to
purchase their
next vehicle
entirely online.

Transforming the automotive workforce for the future

A rapidly evolving industry brings dramatic changes and challenges for the workforce regarding widespread upskilling and reskilling. Plus, the further automotive manufacturers move into electrification and digital systems, the more they must compete with technology industries for a finite talent pool.

Effective, real-time remote collaboration capabilities will be critical for sharing knowledge, sparking innovation and creating strong working relationships. A digital infrastructure and reliable, ultra-low-latency connectivity are fundamental, supporting the augmented, extended and virtual reality solutions that are so important in bringing remote collaboration alive. In many cases, automotive manufacturers will need to use a private 5G solution to match exponentially growing connected elements and secure proprietary systems or intellectual property during collaborative work.

In 2025,
42%
of globally operating automotive and aerospace firms believe an inability to attract talent to their organisation will hinder their digital transformation.



Solutions to drive automotive manufacturing forward

We offer a comprehensive ecosystem of solutions to address the challenges and capitalise on the opportunities automotive manufacturers typically encounter when evolving their technology infrastructure for a future centred on EVs and autonomous driving. Here, we highlight some of our core solutions:

Global Fabric

BT Global Fabric provides a scalable, cloud-centric networking solution designed to handle the increased data traffic and computational demands of innovative technologies such as AI and robotic systems. It's the key to improving productivity by avoiding application downtime, removing network friction and maintaining resilient connectivity.

This revolutionary network simplifies the orchestration of networks, clouds and infrastructures – regardless of provider. It efficiently supports the seamless integration and consistent deployment of solutions across different regions, cloud providers and partners. Global Fabric adjusts configurations worldwide in minutes rather than weeks so automotive manufacturers can alter power, capacity, location and service requirements in real time. It also offers clear routes to optimise cloud and network costs with a pay-for-what-you-use structure and minimised public cloud egress charges.

Edge technology orchestration and computing capability

Our expertise in field area networks, including private / hybrid mobile networks and Wi-Fi, ensures robust and flexible connectivity solutions tailored to specific automotive manufacturing needs.

Combined with edge computing solutions, we enable real-time data processing and analytics at the source, reducing latency, enhancing decision-making capabilities and improving agility. This is crucial for optimising production lines, enabling predictive maintenance, enhancing quality control, ensuring seamless coordination across smart factories and extended reality solutions for immersive training, simulation and remote collaboration.

Intelligently managing AI-driven analytics, IoT sensors and connected machinery at the edge ensures that critical decisions can be made instantly on the factory floor. From this intelligence, edge computing generates strategic maintenance insights so automotive manufacturers can respond instantly to potential equipment failures, optimise production lines, manage natural and human resources efficiently and reduce downtime.

Edge computing also supports optimised workload distribution allowing automotive manufacturers to streamline operations while reducing the burden on centralised cloud systems.





Industrial IoT and IT / OT convergence

We support the integration of Industrial IoT (IIoT) with IT / OT convergence by delivering secure, high-performance connectivity, intelligent automation and advanced cyber security solutions tailored for automotive manufacturing environments. Using the mix of private 5G, SD-WAN and edge computing appropriate for the automotive manufacturer, we seamlessly and securely connect OT systems – such as industrial sensors, robotics and control systems – with IT applications, including cloud platforms and AI-driven analytics, for streamlined, real-time data exchange.

Additionally, our Zero Trust security framework and encrypted data flows safeguard IIoT deployments, ensuring resilient and cyber-secure IT / OT convergence for smart automotive manufacturing.

Operational efficiency

With real-time performance metrics, software-defined routing and a secure, high-capacity core, we optimise maintenance costs and reduce unplanned downtime, aligning with the operational benefits of AI-driven predictive maintenance and robotic systems.

This enables automotive manufacturers to operate more efficiently and respond proactively to potential disruptions. Plus, by integrating encrypted data flows, resilient connectivity and intelligent automation, our solutions prioritise latency-sensitive processes, such as robotic assembly lines and remote machine monitoring, keeping production agile and efficient.

A high-capacity core also supports large-scale data transmission from multiple manufacturing sites, allowing automotive manufacturers to centralise operational insights and optimise production planning more accurately.

Cost-effective scalability

Global Fabric's pay-as-you-use model is a cost-effective route to scaling AI and robotics initiatives without incurring prohibitive costs. With many automotive manufacturers reporting scalability issues, they welcome rapid orchestration, real-time on-demand network access and the ability to avoid investing in slow-to-install hardware.

This means that AI-driven automation, machine learning and IoT applications can be deployed and expanded with fewer financial constraints, and automotive manufacturers can swiftly adapt to changing production demands. Dynamic bandwidth allocation and intelligent traffic management also optimise resource usage and reduce operational costs while maintaining high performance.

Security and reliability

Advanced end-to-end encryption and support for Zero Trust security frameworks ensure critical industrial operations are secured and protected. Real-time threat intelligence and monitoring, plus AI-driven cyber security solutions such as DDoS mitigation, help automotive manufacturers detect and mitigate cyber risks before they impact operations.

Robust security is critical as automotive manufacturing evolves because essential data moves beyond the plant. Without secured information exchange between multiple plants, data centres, offices and third parties, automotive manufacturers are open to intellectual property theft and ransomware. Security is a fundamental requirement because 71% of all ransomware incidents between July and September 2024 were in the manufacturing sector.

We deliver this essential security and ultra-reliable data transfer using a mix of private 5G, SD-WAN, secure cloud solutions and our global network to ensure the resilient, high-performance connectivity crucial for deploying innovative technologies across a global supply chain.

Sustainability

All our solutions are designed with sustainability in mind to support automotive manufacturers' environmental goals. They focus on reducing carbon footprints and resource waste with energy-efficient network solutions, optimised connectivity and intelligent digital technologies that reduce reliance on energy-intensive on-premise infrastructure.

Our solutions help reduce emissions and provide tools to monitor and track energy consumption, optimise production efficiency and minimise waste in real time. To support this, our services - powered by green energy, an efficient infrastructure and adaptive algorithms - optimise manufacturing and corporate environments reducing natural resource consumption.

Our sustainability tools deliver a real-time, in-depth view of total energy consumption and carbon footprint data of any IT services automotive manufacturers buy. They can also drill down to identify carbon-intensive devices and system inefficiencies.

Extended Reality (XR)

Our extended reality solutions offer immersive training, simulation and remote collaboration capabilities to help the workforce keep up with digital automotive manufacturing's rapid advances. XR can enhance workforce training by providing realistic, hands-on experiences without the need for physical prototypes or environments. This technology also supports the training of new joiners and remote maintenance and repair. XR allows experts to guide on-site technicians through complex procedures in real time, reducing downtime and improving efficiency.

Alongside XR applications, digital voice and collaboration solutions are integral to efficient workforce communication worldwide, enhancing how automotive manufacturers use advanced digital solutions.

Digital dealer solutions

Our comprehensive suite of digital retail solutions flexes to meet the demands of the evolving dealership model, including robust online platforms, personalised digital marketing and secure e-commerce capabilities.

As consumer expectations shift towards seamless, omnichannel experiences, our solutions empower dealerships to integrate online and in-person interactions, offering virtual showrooms, AI-driven customer engagement and real-time inventory management. Advanced analytics provide deep insights into buyer behaviour, enabling targeted promotions and personalised financing options.

Additionally, secure digital transaction capabilities ensure a frictionless purchasing process, while automated aftersales support enhances customer satisfaction and retention. By bridging the gap between digital and physical retail, we help automotive brands build stronger connections with customers and drive long-term loyalty in an increasingly competitive market.





Lead your market

Change is happening in the automotive manufacturing sector and we're ready to help you lead this transformation.

Our ambition is to become the world's most trusted connector of people, devices and machines, and we've channelled this ambition into solutions to help automotive manufacturers fully realise the transformative potential of innovative technologies such as AI and robotics in their operations.

Visit our dedicated webpage for more information or contact your account manager to explore the possibilities.

Offices Worldwide

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June 2025