2026 Automotive Analyst Outlook

Key themes for the year ahead

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As we near the end of 2025, AutoTechInsight's practice leads share their perspectives on the challenges and opportunities emerging across their domains.

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Table of contents

About this report

S&P Global Mobility's 2026 Automotive Analyst Outlook presents a comprehensive collection of insights, reflections and forward-looking perspectives from our team of analysts. Drawing on a year marked by volatility, innovation and adaptation, our experts examine how the global automotive industry navigated the challenges and opportunities of 2025 — from supply chain disruptions and regulatory shifts to the evolving landscape of electrification, connectivity and consumer preferences. Through a diverse array of regional and sectoral viewpoints, the report captures not only the lessons learned during a turbulent year but also the strategies and trends that are set to shape the industry's trajectory in 2026 and beyond. By blending data-driven analysis with seasoned opinion, this publication aims to equip stakeholders with a nuanced understanding of the forces at play and the potential pathways ahead. Whether you are an OEM, supplier, policymaker or investor, the following pages offer valuable context for decision-making in an industry that continues to redefine itself amid global change.

How 2025's automotive challenges are defining tomorrow's opportunities

Challenges

The year 2025 was marked by turbulence, as the industry faced a confluence of macroeconomic, regulatory and technological pressures. Trade wars and tariffs, especially those imposed by the US, increased costs and disrupted established supply chains, leading to higher vehicle prices and dampened consumer demand — particularly in North America, where the termination of the Inflation Reduction Act incentives further softened battery-electric vehicle (BEV) sales. In Europe, delayed CO_2 compliance and the influx of competitively priced imports from mainland China subdued local manufacturing and created additional headwinds. Meanwhile, Japanese and South Korean manufacturers grappled with reduced export competitiveness due to tariffs and growing mainland Chinese competition in global markets.

The chip shortage resurfaced in late 2025, this time centered on dynamic random-access memory (DRAM) memory chips, as soaring AI data center demand outstripped supply. Automotive clients, unable to match the profit margins offered by data center buyers, faced steep price hikes and the looming need to redesign vehicle electronics around newer memory technologies by 2028. Supply chain security concerns have extended to rare earth materials, which are essential for electric motors, with mainland China's dominance prompting a search for alternative sources and technologies.

The electrification journey became more complex as BEV adoption slowed in major markets, exacerbated by concerns over affordability, policy uncertainty and infrastructure gaps. Suppliers, especially in Europe, faced financial strain and consolidation pressures, while battery technology advancements — such as solid-state and sodium-ion — remained elusive for mass-market deployment.

Opportunities

Despite these headwinds, several OEMs found ways to thrive. Toyota, for example, capitalized on surging hybrid demand, maintaining strong earnings before interest and tax (EBIT) margins by bucking the "all-in-on-BEVs" trend and investing heavily in hybrid and next-generation battery technologies. The shift toward software-defined vehicles (SDVs) and connected services unlocked new revenue streams, with leading OEMs generating billions from digital features, ADAS subscriptions, and personalized in-car experiences.

Innovation flourished in vehicle interiors, lighting, and materials. OEMs prioritized well-being, technology integration, and sustainability—embracing advanced steels, magnesium thixomolding, and carbon-fiber composites for lighter, safer, and more efficient designs. In China, rapid adoption of EVs, entertainment, and autonomy features, as well as agile manufacturing, set new industry benchmarks.

Charging infrastructure saw steady improvement, with wireless charging and the North American Charging Standard rollout enhancing consumer convenience. Meanwhile, new entrants from China in both chassis and component supply chains increased competition, driving cost efficiencies and innovation.

Key takeaways:

- **Light vehicle production forecast:** In 2026, light vehicle production is forecast to decline moderately due to three key factors: US tariffs, the growth of the mainland Chinese automotive industry and evolving BEV demand, particularly in Europe. North American production is decreasing as higher vehicle prices from tariffs limit consumer support. While mainland China's domestic demand surged in 2025, it is expected to contract in 2026 due to reduced incentives. We expect European markets to see muted demand and increased imports from mainland China, leading to a slight decrease in production. However, Japan and South Korea will also face declines, while South America and South Asia may experience growth.
- **Defying the odds:** In 2025, Toyota stands out in the turbulent automotive industry, maintaining a strong market share while competitors struggle. Unlike others pushing aggressively into BEVs, Toyota has focused on hybrids, investing $912 million in US hybrid production. This strategy has resulted in an impressive EBIT margin of 8.4%, outperforming most OEMs. While demand for BEVs slows, Toyota capitalizes on the rising interest in hybrid electric vehicles (HEVs), with sales up 30%. The company is also investing in next-generation battery technology and developing SDVs, indicating a balanced approach amidst industry chaos.
- **Chassis:** Cost remains a key barrier to the widespread adoption of by-wire systems, with initial implementations seen in premium vehicles like the Tesla Cybertruck and Mercedes-Benz EQS starting in 2025. Electro-mechanical brake (EMB) systems are expected in North America and mainland China by 2026, with broader adoption of

steer-by-wire (SBW) and brake-by-wire (BBW) systems projected from 2028/2029. Traditional suppliers dominate the market, while new mainland Chinese entrants are beginning to affect Europe.

- **Connected car and user experience:** Vehicle human-machine interfaces (HMIs) are evolving to create personalized digital environments, with large dashboards and multiscreen layouts becoming standard. The 2025 Mercedes-Benz EQS and Cadillac Escalade IQ exemplify this trend. Panoramic HUDs (P-HUDs) are gaining traction, offering innovative display methods. GenAI chatbots are enhancing user interaction in connected vehicles, with projections indicating 28 million units will be shipped by 2031. As vehicles become software-defined, OEMs are generating significant revenue from connected services and ADAS features. To succeed, they must develop compelling digital service strategies and foster consumer adoption through trial programs and innovation.
- **E/E and Semiconductor:** The automotive industry faces another chip shortage starting in the first quarter of 2026, primarily affecting DRAM chips essential for vehicle systems. This crisis, driven by increased demand from AI data centers, could disrupt production and lead to panic buying among OEMs, reminiscent of past shortages. As major DRAM manufacturers prioritize higher-margin data center products, automotive clients may see price increases of 70% to 100%. By 2028, older generation DRAM types will be phased out, necessitating a swift transition to newer LPDDR5 technology. The industry's capacity for automotive DRAM remains constrained, with potential relief hinging on developments in mainland Chinese suppliers.
- **Electrification:** In 2026, electric vehicle adoption will slow but still grow, impacted by tariffs and trade wars. The automotive electrification sector faces challenges as suppliers struggle financially, while the industry shifts focus to Greater China, where competition is fierce. Battery technology remains dominated by CATL, but concerns about excess capacity and the transition to sodium-ion and solid-state batteries persist. Charging infrastructure is improving with the rollout of wireless charging and the North American Charging Standard. Additionally, supply chain security for rare earth materials is critical, prompting a re-evaluation of hybrid technologies and power module production dynamics.
- **Interiors:** Vehicle interiors are increasingly prioritized by OEMs, focusing on well-being, technology integration and high-quality materials. There has been a shift from plastic to soft-touch elements, with varied approaches to control buttons — some opting for physical buttons while others integrate controls into infotainment systems. The supplier landscape faces consolidation due to shrinking margins and new regulations. Seats are evolving with features such as motorized adjustments, particularly in mainland China, which is also driving innovation in sunroofs and smart glass technologies. This trend reflects a rethinking of interior design and functionality, enhancing both comfort and safety.
- **Lighting:** The lighting industry is innovating with a shift toward microLED headlamps among European OEMs, including brands like Cupra and Volkswagen, while Digital Light Processing (DLP) technology remains common in mainland China. The global penetration of the front projection market is projected to exceed 5% by 2031, with adaptive driving beam (ADB) systems expected to reach 24%. German OEMs are increasingly adopting illuminated front grilles, a trend that has already been established in mainland China. The supply chain faces challenges as new players emerge, increasing complexity and prompting ongoing mergers and acquisitions in the exterior illumination market.
- **Materials:** In 2025, car consumers showed diverse preferences globally. Mainland China accelerated EV adoption, focusing on entertainment and autonomy, while Europe faced delays in CO2 compliance, which impacted BEV growth due to affordability concerns. North America witnessed a preference for SUVs and pickups amid less supportive EV policies. The automotive industry is shifting toward innovative materials such as press hardened steels (PHS) and ultra-high strength steels for lighter, safer designs. Magnesium thixomolding is gaining traction in mainland China, while carbon-fiber composites are in demand for their weight-saving benefits. By 2026, we can expect more advanced autonomous vehicle models and evolving material choices in car design.

Overview

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Toyota's triumph: Thriving while others falter

Tumult. Turmoil. Turbulence. Tariffs. Trump. These were the words that first came to mind when asked to review 2025 and look ahead to 2026. However, rather than be another doom-and-gloom merchant as the automotive industry endures yet another transformative phase, I settled on another "T" word: Toyota.

The industry darling of the 1990s and early 2000s achieved innumerable successes. These included the Toyota Production System, which established the industry's lean manufacturing culture; the successful launch of Lexus as a premium brand upstart; and its success with the Prius, the first mass-produced hybrid electric vehicle when it debuted in Japan in 1997. Although Toyota had seemingly fallen out of fashion as Tesla and mainland China's new-energy vehicle (NEV) startups assumed its mantle, it is now quietly succeeding in the current difficult market conditions. Meanwhile, competitors are either scrambling for partnerships or scaling back ambitions. Its market share has held remarkably steady since 2020, while competitors such as Honda, Volkswagen, General Motors and Hyundai have declined considerably under the pressure from domestic brands like BYD, Chery and Changan. Its achievements have been notable, despite not having an all-out push into NEVs that the mainland Chinese market has feasted on.

Toyota has flouted recent industry conventional wisdom, which essentially states:

- Go hard at BEVs to build scale, even at the risk of thin or negative margins.
- Pivot smartly to software-defined architectures and autonomy to cash in on the "smartphone on wheels" shift.

Instead, Toyota has doubled down on hybrids (see its recently announced $912 million investment in US hybrid vehicle production) and treated BEVs and SDVs as a secondary focus. It has been rewarded, despite all the T-words enveloping the industry. Its EBIT margin has trumped all its major original equipment manufacturer competitors, bar one. through each quarter of 2025. While a cohort of 15 OEM competitors has averaged an EBIT margin of 4.16% in 2025, Toyota has maintained a steady margin of 8.4%. While one might assume the company faring better than Toyota is Tesla or BYD, it is actually Suzuki. The company benefits from limited exposure to tariffs, its dominance in the growing Indian market and not risking everything on BEVs or SDVs.

Toyota has mainly benefited from slowing BEV demand growth as demand- and supply-side incentives are scaled back. This has led to a resurgence in HEV demand, for which Toyota has been well-positioned to capitalize, with HEV sales surging by 30% in fiscal year 2023–24.

This does not mean that Toyota is eschewing industry conventional wisdom. It is actively making bets that it hopes will see it surpass the competition in BEVs and SDVs. With BEVs, it is seeking leadership in next-generation battery technology, particularly solid-state batteries, which it has invested heavily in and aims to bring to market by 2030. By then, it hopes the regulatory environment, battery technology and charging infrastructure will be more mature. Toyota is also developing SDVs (its Arene operating system and software platform) and autonomous vehicles, focusing on safety and convenience benefits for consumers rather than a new robo-taxi business model. The company's Woven by Toyota arm is leading both its SDV and autonomy initiatives.

It remains to be seen whether Toyota’s cautious approach in the face of all the noise generated by BEVs and SDVs will once again pay off. However, its current success demonstrates that we should think twice about dismissing Toyota’s prospects.

Light vehicle production forecast

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Regional insights: How trade policies and competition affect global automotive production

For 2026, we forecast a moderate decline in light vehicle production. Three main themes will continue to dominate: US tariffs and trade policy, the growth of the mainland Chinese industry both at home and abroad and evolving battery-electric vehicle (BEV) demand, particularly in Europe.

In North America, production is trending downward; with inventory aligned to demand in most cases across the industry, there will be little support from consumers as model year 2026 and 2027 vehicles arrive to the market with higher-than-average price increases stemming from the tariffs. In 2025, stronger-than-expected activity as consumers rushed to purchase pre-tariff affected vehicles will create a pull-ahead effect, which was bolstered following the Sept. 30, 2025, termination of the Inflation Reduction Act (IRA) incentives of up to $7,500 for the purchase of a new BEV.

Activity in mainland China consistently surprised on the upside during 2025 as a wide range of stimulus measures boosted domestic demand, and as export activity grew as a way to ease pricing competition in the domestic market. With the support of these effects in 2025, the outlook for 2026 is reduced, as trade-in incentive schemes are expected to see diminishing returns, and short-range PHEVs will be excluded from the new-energy vehicle purchase tax reduction, which itself has been cut from 10% to 5% for 2026 and 2027. As a result, we forecast production levels to contract in 2026.

In core European markets, we expect muted domestic demand to be hindered by adverse trade flows, particularly imports from mainland China, which are expected to grow significantly and suppress local manufacturing. The result is a marginal year-over-year decrease in production, with some possible upside linked to the imminent relaxation of CO_2 emission targets for vans, set to be announced by the European Commission in mid-December. In adjacent markets, we are seeing demand recovery and kit assembly expansion, which supports production volumes in Russia and the Commonwealth of Independent States. Overall, we forecast output levels in the region to remain effectively flat in 2026.

Japanese and South Korean operations are majorly exposed to conditions in the US market, given the size of their export trade. With trade agreements struck with the US for tariffs at 15%, similar to those for the European Union, the cost of imports has become more expensive. However, if these trade deals are implemented, they will bring clarity that was missing for much of this year. In 2026, production levels are expected to decline in both countries due to limited domestic demand and increased competition from mainland China in overseas markets, excluding North America. South America and South Asia (ASEAN and India) are expected to see growth tied to local dynamics and their relative isolation in US auto-specific tariffs. Supportive tax policies in Brazil and India will bolster local production efforts.

Chassis

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Emerging vehicle architectures and rapid technological progress in Greater China are expected to significantly accelerate long-term innovation in chassis technologies. While mature technologies such as advanced dampers are expanding rapidly in mainland China, Chinese suppliers are also entering Europe to supply calipers.

New technologies: Steer by wire and brake by wire

In the short term, cost remains a significant barrier to the large-scale rollout of by-wire systems, despite ongoing improvements in performance. As a result, we are beginning to see by-wire technologies adopted primarily in premium vehicles — such as the Tesla Cybertruck, Nio ET9 and Mercedes-Benz EQS — starting in 2025 with steer-by-wire.

In 2026, the first electro-mechanical brake (EMB) systems are expected to appear in both North America and mainland China, while initial deployments in Europe are likely to occur in 2028/2029.

Steer-by-wire (SBW) and brake-by-wire (BBW) are then projected to scale more broadly from 2028/2029 onward, supported by new vehicle platforms designed around centralized electronic architectures. In the long term, by approximately 2037, these two technologies could reach a global market penetration of about 30%.

Mature technologies and supply chain

For emerging technologies such as SBW and BBW, traditional suppliers will continue to dominate the global market, including ZF, Aumovio, Bosch, Advics, Mando, JTEKT and Nexteer. Only in the long term are we likely to see new mainland Chinese suppliers gaining relevance, primarily within the domestic market.

The situation is entirely different for mature technologies such as suspensions and calipers. For suspensions, we observe exponential growth in the volume of semi-active and active systems in the mainland Chinese market, both in the short and long term. In contrast, volumes in Europe and North America are expected to remain largely stable, with only limited upside. New mainland Chinese suppliers will likely capture a significant share of this market in the region.

As for calipers, several mainland Chinese suppliers are already entering the European market (e.g., APG supplying Stellantis and WBTL supplying Renault). This marks the beginning of a trend in which mainland Chinese suppliers provide components to European OEMs, starting with simpler products and progressively moving toward more complex systems over time. This dynamic increases competitive pressure on European players, who must now contend with a cost-aggressive new entrant.

In conclusion, the coming years promise to be particularly dynamic — not only for vehicles, but also for chassis components, which have traditionally been very stable and slow to change. However, today, they are being pushed toward a radical transformation to enable the new era of electric and autonomous vehicles, where the driver is no longer 100% responsible for vehicle control. Instead, responsibility will be increasingly shared — or even fully transferred — to automated systems.

As a result, flexibility and seamless integration of steering and braking systems become essential to ensure a smooth transition between human and machine control.

Connected car and user experience

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Future vehicle HMIs: From curved screens to AI assistants

With vehicle human-machine interfaces (HMIs) designed to create personalized and adaptable digital environments, large, unified dashboards and seamless multiscreen layouts have become the norm. OEMs and display suppliers are pushing for differentiated designs via display shape, layout, curvature and integration, not just for functionality but visual identity. The 2025 Mercedes-Benz EQS is a good example of this, as it features one of the biggest curved displays: the 56-inch MBUX Hyperscreen, while the 2025 Cadillac Escalade IQ boasts a 55-inch multidisplay module. Multidisplay modules have yet to gain significant traction; however, global demand for these systems is expected to surge to over 12 million units by 2031.

Although still at an early stage, panoramic head-up displays (P-HUDs) based on holographic displays have become popular in recent months. Unlike conventional head-up displays (HUDs), P-HUDs do not project the display onto the transparent area of the windshield; instead, they reflect all essential information with exceptionally high light intensity onto a black-printed area along the lower edge of the windshield. Most top tier 1 suppliers, such as Continental, Harman and Marelli, have developed their P-HUD versions that are being readied for production vehicles, one of them being the much-anticipated BMW Neue Klasse. It is yet to be determined if this trend will stick or remain a go-between until transparent displays are ready for mass production.

GenAI chatbots are increasingly being integrated into premium and connected vehicle models. Volkswagen, for example, announced that its IDA assistant will integrate with ChatGPT (OpenAI) for complex queries while keeping basic commands local. Mercedes-Benz's newer MBUX Virtual Assistant uses Google's Automotive AI Agent (based on Gemini) to handle multiturn dialogues, recommendations and more personalized interactions; and Tesla (for the mainland Chinese market) integrates local AI (via DeepSeek and ByteDance) for a "Hey Tesla" voice assistant. Through over-the-air (OTA) updates, Li Auto enables users to create personalized infotainment cards for entertainment, information and vehicle status using natural language. The intelligent assistant also connects with third-party services to support convenient features, such as food ordering and parking payments. Global shipments of light vehicles featuring an automotive GenAI chatbot are projected to grow to around 28 million by 2031.

SDV return on investment

What have we learned in the early years of SDV buildup? Regarding return on investments, data is not, in fact, the new oil. As vehicles become increasingly software-defined, always-on connectivity enables real-time data exchange with the environment and seamless integration with the cloud. This foundation powers connected features and services that are continuously enhanced through OTA updates.

Leading OEMs are already generating billions in connected services revenue, driven by growing connected fleets, stronger brand engagement, simplified service bundles at competitive prices and accelerating consumer adoption of new features.

Paid update programs for ADAS Level 2+ features such as General Motors Super Cruise, Ford BlueCruise and Tesla Full Self-Driving continue to gain traction, with high trial engagement and strong conversion rates. OEMs now count millions of software subscribers, generating hundreds of millions in revenue from Level 2+ ADAS packages alone, often at margins exceeding 70%. A growing portfolio of on-demand features, including custom lighting patterns, display themes, immersive sound experiences, and other personalization options, solidifies software as a profitable growth engine.

To unlock the full potential of digital services, OEMs need to define compelling value propositions for software features, provide trial programs to accelerate consumer adoption and develop digital services capabilities through in-house innovation or strategic partnership. As the market continues to evolve, these strategies will be essential for driving sustainable profitability in a software driven future.

E/E and Semiconductor

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The next automotive chip shortage

We all recall the 2021 chip shortage that disrupted the automotive industry for several years. We are just exiting the Nexperia chip crisis, which caused panic starting in mid-October. Brace yourself. We expect another shortage to begin in the first quarter of 2026. While it may be less dramatic than the 2021 crisis, which prevented the production of over 10 million cars, it could be more disruptive and last longer than the Nexperia crisis.

The 2026 crisis will primarily involve dynamic random-access memory (DRAM) chips. DRAM acts as the “short-term memory” in computers, storing data that is being processed. It is essential in computing-power-intensive systems in cars, particularly in cockpits and advanced driver assistance systems (ADAS) or autonomy systems.

What happened? A perfect storm is brewing:

- Over three years ago, OpenAI launched ChatGPT, accelerating AI usage for both businesses and consumers.
- To support this soaring AI demand, data centers are emerging rapidly.
- These data centers rely heavily on graphic processing units (GPUs), making NVIDIA the largest market cap ever.
- Each GPU module contains a special type of DRAM known as high bandwidth memory (HBM), which has multiple layers of DRAM silicon dies stacked together. This design means GPUs consume more DRAM silicon than planar DRAM chips used in cars.
- DRAM manufacturers did not anticipate this surge in demand from data centers, resulting in a capacity deficit for DRAM wafer fabrication. Following the introduction of ChatGPT in 2023, the volatile DRAM industry faced a crisis of overcapacity, leading to heavy losses for suppliers and minimal investment in new capacity. Although capital expenditure (capex) surged significantly in 2024 and beyond, building a wafer fab and ramping up production takes years.
- The automotive industry faces bad news: The profit margins for DRAM are much higher for data center products than for automotive applications. Recently, the top three DRAM manufacturers decided to prioritize the more profitable data center segment over automotive. Furthermore, they announced plans to cease production of older technology DRAM — specifically DDR4 and LPDDR4 — currently the majority used in vehicles.
- Following the end-of-life (EOL) announcements for DDR4 and LPDDR4, OEMs and tier 1 suppliers have begun panic buying, reminiscent of the behavior seen in 2021.

What’s coming? Two phases of the crisis:

2026–2027: Price-elastic supply and anecdotal “toilet paper” shortage

- DRAM suppliers have clarified that the EOL of DDR4 and LPDDR4 applies to consumer products, but production will continue for automotive for a few more years (S&P Global Mobility estimates through the end of 2027).
- While capacity will be constrained, it may be elastic. If automotive clients are willing to pay more to match the wafer value that DRAM makers can obtain from other industries, they will receive the necessary volume. New contracts may result in DRAM price increases of 70% to 100% in 2026 compared with 2025 prices — a significant rise for premium vehicles with advanced cockpit and autonomy features, which already had over $150 of DRAM in 2025.

- OEMs and tier 1 suppliers that doubt DRAM suppliers or hesitate to place orders at these elevated prices will find themselves at the back of the line, unable to secure the chips they need.
- We may also witness anecdotal disruptions in car production, primarily driven by panic buying, similar to the “toilet paper effect” seen at the onset of the COVID-19 crisis and during the 2021 chip shortage.

From 2028 onward: Redesigning cockpit and ADAS systems

- By 2028, the supply of older generation DRAM for the automotive industry will rapidly diminish, regardless of the price.
- Most cars scheduled for production in 2028 are designed using DDR4 and LPDDR4, which will no longer be available (the top 10 cockpit designs and eight out of the top 10 ADAS designs forecast for 2028 rely on DDR4 and LPDDR4).
- The industry has a two-year window to redesign and transition to the newer generation LPDDR5, which will still be in production.
- While two years is sufficient, all stakeholders — processor suppliers, cockpit and ADAS tier 1 suppliers, and OEMs — must act swiftly. Some are still in a “wait and see” mode, indicating they are merely monitoring the situation.

The road ahead for the automotive industry

- S&P Global Mobility anticipates that capacity for the newer generation LPDDR5 could also be constrained as DRAM suppliers continue to prioritize higher-margin data center clients. Although the capex investment surge from 2024 will add capacity, data centers are likely to absorb most of it.
- There is no immediate solution to increase capacity. The top three DRAM manufacturers, which are shifting their focus toward data centers, currently account for 88% of the automotive DRAM supply. Smaller suppliers cannot compensate for the automotive DRAM shortfall, and there are no foundries like TSMC that can rapidly scale up DRAM fabrication.
- DRAM is expected to be the most visible supply bottleneck for automotive chips in 2026 due to soaring demand from AI data centers. These data centers are consuming other chips, straining the supply of various semiconductor categories. Capacity is already tight for advanced semiconductor process nodes of 7 nanometers (nm) and below, which includes the latest generation processors or systems on a chip (SoCs) for cockpit and autonomy applications. There are also signs of allocation issues for flash memory, and prices are starting to rise. Concerns are emerging regarding the limited global packaging capacity for discrete semiconductors required for power management electronics in data centers, which also raises concerns for the automotive discrete supply chain.

Is the potential burst of the AI bubble the only salvation?

Headlines predicting the end of the AI hype have been increasing since OpenAI’s CEO Sam Altman warned about the AI bubble in August 2025. A decline in HBM demand from AI data centers could indeed alleviate wafer capacity constraints for the automotive industry. However, the S&P Global 451 Research team covering data centers believes that while a correction is imminent, investments in AI infrastructure will slow but continue. The automotive industry must prepare for longer-lasting structural constraints on the supply of some components also used in data centers.

The only potential light at the end of the tunnel could, indirectly, come from mainland China. Its domestic DRAM supplier, CXMT, is still small but rapidly advancing in technology and increasing production. However, it is unlikely to supply automotive DRAM to the global market, as non-Chinese OEMs are “de-risking” their supply chains by removing chips with design or fabrication steps in mainland China since the Nexperia crisis. Nevertheless, mainland China is currently absorbing a significant portion of the capacity from global DRAM suppliers (accounting for over 20% of the revenue of the top two DRAM suppliers). If CXMT successfully captures market share from foreign DRAM suppliers in mainland China, it could free up capacity at global DRAM makers and ease the constraints on automotive DRAM supply.

Electrification

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The complex journey of electric vehicle adoption and supply chains

The rate of electric vehicle adoption in major markets is slowing, yet it remains a growing trend, a development complicated by tariff implementations and trade wars. This situation has left many in the automotive electrification technology sector in a challenging “wait and see” position. Suppliers investing heavily in R&D and new technologies for EVs may now seem overly ambitious or naive. Amid diverging attitudes toward EVs in key markets, financial struggles among several major and numerous smaller European powertrain component suppliers have made survival a priority.

As the industry’s center of power continues to shift toward Greater China, 2025 has marked a significant acceleration of this trend, largely driven by varying rates of EV adoption. The ongoing price war among mainland Chinese automotive players has severely impacted the margins and market shares of overseas OEMs that once enjoyed substantial profits in this burgeoning market. This pressure has led to lower margins across the board, industry consolidation to achieve economies of scale and increased partnerships in mainland China to leverage local manufacturing capabilities and engineering talent. Reports of e-Axle contracts being awarded at a loss to maintain production lines highlight the unsustainability of this approach. Moreover, companies like Audi, with their new branding and E5 model, and Land Rover, launching a China-only Defender brand, are pivoting strategies to focus on local products for local markets.

In Europe, where the automotive industry is a cornerstone of the continent's industrial strategy, the implications are profound. Industry bodies, led by OEMs, are advocating for a relaxation of internal combustion engine (ICE) phase-out legislation to avert further large-scale job losses. While Germany has supported the transition to EVs with billions in investment, it faces lukewarm domestic demand, increasing tariffs in the lucrative yet cautious US market, and fierce competition from rapidly advancing, vertically integrated domestic players in mainland China. The response of European OEMs and the technologies they adopt in their next-generation BEVs to regain market share in mainland China will be particularly intriguing, with Volkswagen's shift from MEB to SSP/CSP serving as a compelling case study.

Batteries: scaling challenges, incremental improvements, and solid-state indifference

Greater China maintains a lead in battery technology, driven by CATL and its extensive domestic supply chain. In 2026, CATL is expected to produce an additional 95.5 GWh of batteries, increasing its market share by 0.6 percentage point. As the supply chain matures, established players are solidifying their positions, while smaller niche operators become ripe for acquisition amid industry consolidation. In Greater China, our data indicates an excess capacity, with factories operating at an average utilization of just 20% at the end of 2025. This oversupply will likely improve slightly to 22.6% in 2026 but remains unsustainable without diversification into other applications, such as stationary energy storage (SES).

With lithium prices seemingly bottoming out and rising again — largely due to ESS demand — attention has shifted back to sodium-ion technology for the low-cost segment of the EV market, where margins are tight. However, we do not expect mass-market light passenger vehicle applications until 2031, as incremental improvements in existing lithium-iron-phosphate (LFP) technology threaten sodium-ion’s market potential.

Another much-discussed innovation, solid-state batteries, appears to be delayed yet again, with 2025 marked by bold promises. Significant challenges remain in working with lithium sulfide due to its hazardous nature. Emerging producers are trying to convince investors that laboratory results can be scaled and that the potential benefits justify further financing. Market entry before 2030 seems overly ambitious. With impressive gains in Generation 5 LFP lithium-ion technology likely sufficient for mass-market needs, one must question the necessity of solid-state technology. Will it serve high-end applications where energy density is critical, or become the technology that promised much but ultimately failed to deliver for BEVs? We hope that 2026 will provide clearer insights.

Signs of an improved charging experience as station rollout continues

The rollout of EV charging stations continues unabated, with initial signs of network consolidation emerging. In the UK, for example, major private operators are taking over the ChargePlace Scotland network, mirroring the approach initiated for Source London in 2021. These developments signal growing usage and market maturity but also highlight the challenging cost structures associated with scaling assets that remain, on average, highly underutilized.

BYD's announcement of megawatt charging capability on its Super-e Platform, along with the corresponding station installations, has sparked an arms race to showcase technology leadership in this area. Although the rollout of these stations has fallen short of initial targets, we are closely monitoring the deployment of 1,000-V capability across the BYD range to gauge its prevalence. In the long term, megawatt charging opportunities are expected to be prioritized for medium and heavy-duty applications, where the need is more pressing.

Wireless EV charging received a boost in 2025 with its introduction as a cost option on the Porsche Cayenne Electric. While other OEMs have explored this technology for years, it now appears poised to serve as a premium differentiator. We forecast that an additional nine nameplates will feature wireless charging in 2026.

In the US, the rollout of the North American Charging Standard (NACS) plug, replacing the Combined Charging System (CCS), is underway. OEMs aligning with Tesla's proprietary plug type began rolling out vehicles in 2025, and we expect that by the end of 2025, 16% of US BEV vehicles from brands other than Tesla will use the NACS plug, rising to 29% by the end of 2026. This rollout brings much-needed clarity and standardization, which is likely to encourage other resistant OEMs to follow suit.

Propulsion supply chain security back in focus with rare earth reminder

The discussion around rare earth supply chain security and its potential impact on electric motor production provided an uncertain backdrop throughout 2025. Mainland China's dominance in this sector has left other nations scrambling to reduce their dependency. For instance, we expect 87% of European-built propulsion electric motors to require magnets in 2026; however, there are no viable local sources scaled up to supply the necessary neodymium, dysprosium or terbium. Beyond alternative sourcing routes, major automotive suppliers and technology companies are focused on overcoming the technical compromises associated with rare earth-free technologies.

The slowing adoption of BEVs and certain OEMs pivoting back to hybrid technologies have led to perceptions that supply chains embraced electric vehicles too readily. This challenging balance has prompted suppliers to reconsider divestments and question whether consolidation occurred too rapidly, which is particularly evident in the turbocharger sector, where demand remains strong. The renewed interest in range-extended electric vehicle (REEV) powertrains, exemplified by Li Auto's success in Greater China, is prompting OEMs to reevaluate possibilities. Clean-sheet developments from Western automakers will encourage suppliers to optimize battery, motor and engine technology choices for unique duty cycles, potentially becoming another engineering battleground where mainland China holds a head start.

Another key area to monitor in 2026 is the blurring of supply chain lines within power module production tiers. Traditionally, the assembly of power semiconductors into switching devices has been a tier 1 manufacturing process. However, this responsibility is increasingly shifting to tier 2 suppliers, that are eager to assert greater control over the supply chain.

Thermal management technology optimization: potential supplier consolidation in a cautious "wait-and-see" year

In 2026, the thermal management sector will remain busy due to regulatory developments and challenges posed by commoditization. While major advancements may be stagnating, several important technical capabilities are set to progress toward implementation.

The EU is expected to introduce regulations restricting the use of chemical refrigerants by 2029, with a ban taking effect in 2036. Natural refrigerant systems are still under investigation, lacking a clear timeline for market debut. Meanwhile, R-744 refrigerant appears to be losing traction in favor of R-290, which offers a more cost-effective solution.

Battery thermal management is gaining prominence, as it is crucial for enhancing the charging experience. Thermal system suppliers and battery pack manufacturers are exploring alternative cooling designs to improve cooling and heating homogeneity. Innovations like top and bottom plates and snake cooling plates — recently deployed on the BMW NCAR platform — are emerging, challenging the previous standard of bottom cooling plates. It remains to be seen whether BYD will continue its “unique” approach of using direct refrigerant cooling in BEVs while other OEMs opt for indirect coolant cooling.

Heat pump and integrated thermal module technologies are spreading from BEVs to REEVs, as the latter adopt a global engineering focus. The market share for integrated systems is rising as emphasis is placed on optimizing trunk/frunk space. Smaller, cost-effective heat pumps are being developed for REEVs, and there is a noticeable increase in "off-the-shelf" heat pump systems. The shift of ancillary components to 48V networks continues to see implications on thermal management components such as pumps, motors, fans and valves.

As thermal components become more standardized, high-volume manufacturers are favored, leading to increased sourcing from Greater China, which offers competitive pricing and technological advantages. This trend may result in further market consolidation. However, due to the intense competition in the automotive sector, many thermal companies are pivoting toward the AI robotics and energy storage battery industries in search of better margins.

Interiors and Lighting

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Headlamp technologies in transition: A focus on MicroLED and ADB developments

The lighting industry continues to innovate, introducing new lighting technologies to the market. An increasing number of European OEMs are offering microLED headlamp technologies, moving away from Digital Light Processing (DLP) technologies. This trend is evident not only in premium vehicles; brands like Cupra, Opel, and Volkswagen are now providing microLED headlamps, alongside Porsche, Audi and Volvo. We expect Mercedes-Benz to follow this trend, while BMW appears to be hesitating.

In the mainland Chinese market, DLP technology is still prevalent, although companies like Nio, BYD and Zeeker are incorporating microLED into their vehicle portfolios. A key difference between the European and mainland Chinese markets is that in Europe, projection technologies such as microLED and DLP are considered part of adaptive driving beam (ADB) systems, whereas in mainland China, they can function independently without ADB.

Overall, we anticipate growth in the front projection market, with a global penetration rate exceeding 5% by 2031. Meanwhile, we expect ADB to reach a global penetration rate of 24% by the same year. Recent regulatory changes in the United States and new requirements for ADB headlamps are likely to result in only a modest increase in ADB adoption among OEMs in North America.

In addition to headlamp technologies, German premium OEMs are also committing to illuminated front grilles. While this has previously been uncertain, recent evidence from the last IAA in Munich suggests that German premium OEMs are likely to adopt illuminated grilles more widely in the future. In contrast, mainland Chinese OEMs are already offering this feature on a broader scale across their models. The focus is shifting toward adding additional illumination to both the front and rear ends of vehicles, alongside traditional headlamps and rear lamps. Daytime running lights (DRLs) play a significant role in the overall vehicle lighting design.

The supply chain is facing challenges as, in addition to conventional tier 1 lighting suppliers, new players are entering the market for exterior illumination. Grille suppliers and those providing bumpers or entire front-end assemblies are increasingly significant in the lighting market, adding complexity to the overall supply chain. We have already witnessed some mergers and acquisitions in the market, and we expect this trend to continue in the future.

Reimagining interiors

Vehicle interiors are increasingly becoming a focal point for OEMs, emphasizing overall well-being, technology integration and material quality. OEMs are moving away from purely plastic panels, offering more soft-touch elements combined with carefully selected decorative features. One significant aspect remains the philosophy surrounding control buttons. Some OEMs are reverting to physical control buttons, while others continue to integrate controls into infotainment modules, with a range of approaches in between. It is challenging to predict the trend toward smart surfaces and smaller displays, given the current rethinking of interior and cockpit design.

The traditional tier 1 interior supplier landscape is under pressure due to shrinking margins over the past few years and new regulations, including proposed end-of-life vehicle (ELV) and CO_2 emission regulations. This has caused ongoing consolidation within the supplier landscape.

Vehicle seats are also a key focus for OEMs, with additional convenience functions being introduced. Mainland Chinese OEMs are particularly attentive to the second-row seating, as rear seats become increasingly important for advanced features such as motorized adjustments, thermal functions and ergonomic applications. The trend toward ADAS is prompting discussions around new seat configurations and heavily reclinable seats for enhanced driving comfort, which pose challenges for overall vehicle safety. New airbag and seatbelt concepts are necessary to address safety concerns associated with these heavier reclinable seats. Mainland China remains a major market for innovation, exerting cost pressure on the entire supply chain.

Often overlooked in discussions about vehicle interiors is the sunroof. Fixed panoramic glass roofs have been significantly increasing and will likely be offered on base trims; we expect that higher trims will offer openable panoramic floating roofs.

For fixed sunroofs, some OEMs have begun introducing smart glass technologies such as polymer dispersed liquid crystal (PDLC), suspended particle device (SPD) and electrochromic glass (EC). These technologies eliminate the need for additional sunshades. We now find ourselves at a turning point, as some OEMs continue to offer more complex sunshade systems while others opt for the more costly smart glass solutions in their vehicles.

Materials

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Regional insights: Material innovations and consumer preferences

Consumers across various regions are increasingly exhibiting diverse interests and demands for the new generation of automotive products they are willing to purchase. In 2025:

- **Mainland China** continued to accelerate the adoption of EVs through policy incentives and scaling advantages. Consumers in the region have demonstrated a high demand for in-car entertainment and connectivity features, as well as a strong interest in highly autonomous driving initiatives.
- **Europe** announced a delay in its CO_2 compliance agenda, leading to a growth in battery-electric vehicles (BEVs) that fell short of expectations. Affordability, reliability, and convenience remain dominant factors for most new car buyers in this region.
- **North America** introduced a new framework of regulations and financial policies that are less supportive of the transition to EVs. Sport utility vehicles (SUVs) and pickups remain the most popular choices among car users, indicating a universal consumer preference for space and versatility.

This trend of de-globalization in the automotive industry is also driving new trends in car body design and the adoption of advanced materials.

- **PHS:** Aluminum gigacasting may no longer be the only solution for integrating parts in car bodies. The use of hot-stamped steels enables integration of multiple smaller parts into a single larger component, saving weight, reducing costs and simplifying manufacturing. One-piece door-ring reinforcements and consolidated structural frame members have become widespread in recently launched EV models. PHS helps reduce material thickness without compromising strength, resulting in significant weight reductions compared with conventional multipiece designs. The rapid growth in the use of PHS will align with advancements in tailored-welded blanks (TWB) and tailored-roll blanks (TRB).
- **Innovative cold forming approaches for ultra-high strength steels:** Roll forming ultra-high strength steels (such as 1300/1500/1700 MPa Martensite and 1180 MPa DP/DH) into continuous profiles for car bodies is transitioning from niche to mainstream. Enhancements in precision forming control techniques and increasing standards for vehicle collision safety are the drivers of this shift. As both tier 1 suppliers and OEMs become more sophisticated in their roll-forming applications, we expect innovations to further extend the limits of material gauges and allowable shapes.
- **Magnesium thixomolding:** With mainland China potentially leading in the application and innovations of giga-casting for integral automotive components, attention is shifting from aluminum to magnesium, which is abundantly available in the market and offers stable upstream pricing. Domestic machinery makers such as LK Technology, Yizumi and Haitian, are collaborating with local tier 1 suppliers and automotive OEMs to provide equipment for magnesium thixomolding, enabling simpler operations and faster changeovers that align with demands of mainland Chinese factories for speed and repeatability. The ongoing trend toward lightweighting and agile manufacturing with modular component designs will further promote the use of magnesium thixomolding in electrified vehicle models in mainland China.
- **Composites:** Innovations in material science and manufacturing processes have driven demand for carbon-fiber hybrid materials, achieving significant weight savings without compromising structural integrity. Renovated processes and automated production methods are continuously emerging, facilitating the efficient fabrication of affordable parts for the auto industry. Developments such as bio-based precursors and novel resin systems are

improving sustainability and performance metrics. Their use in production-based cars seem promising in the coming years, as they support smart and stylish interior designs prioritized by new generations of car consumers.

In 2026, we can expect to see more vehicle models with advanced autonomous driving features launched worldwide. How will enhanced active safety technologies influence the traditional passive safety design? How will the evolution of the interior design in autonomous driving vehicles come about? All of these will certainly give an impact to the material choices for relevant parts. We will continue to seek answers to these questions.

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