INDUSTRY OVERVIEW

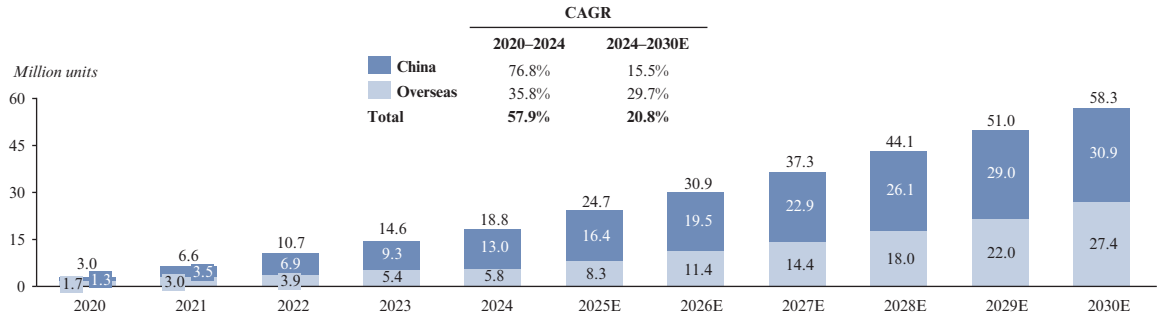
The information and statistics set out in this section and other sections of this document were extracted from different official government publications, available sources from public market research and other sources from independent suppliers, and from the independent industry report prepared by CIC (the "CIC Report"). We engaged CIC to prepare the CIC Report, an independent industry report, in connection with the [REDACTED]. Information and statistics from official government sources have not been independently verified by us, the Joint Sponsors, the [REDACTED], the [REDACTED], the [REDACTED], the [REDACTED], the [REDACTED], any of the [REDACTED], any of our or their respective directors, officers or representatives or any other person involved in the [REDACTED] and no representation is given as to their correctness or accuracy.

DEVELOPMENT TRENDS OF GLOBAL AUTOMOTIVE INDUSTRY

Increasing Electrification, Intelligence and Connectivity Drives Higher Automotive Component Value per Vehicle

The transformation of the automotive sector toward electrification, intelligence and connectivity ("Three Transformations") has become a global consensus. Three Transformations is driving vehicles to evolve from traditional transportation tools into intelligent mobile terminals. Electrification reshapes powertrain architecture, intelligence enhances the driving experience, and connectivity enables integrated information interaction across the vehicle ecosystem. These developments raise requirements for higher precision, greater integration and enhanced intelligence of automotive components. As a result, the proportion of high-value components continues to increase, while new component categories continue to emerge, collectively driving the growth in automotive component value per vehicle. Policy support across major economies, together with sustained strategic investments by leading OEMs, continues to accelerate the structural transformation of the automotive sector. Meanwhile, driven by increasing consumer demand for superior driving experience and continued innovation by OEMs in the NEV sector, global NEV sales have experienced rapid growth. Global NEV sales volume increased from approximately 3.0 million units in 2020 to 18.8 million units in 2024, and is expected to reach 58.3 million units by 2030, becoming a key driver of the transformation of the automotive sector.

Global New Energy Vehicle Sales Volume, by Region, 2020–2030E



Sources: International Organization of Motor Vehicle Manufacturers, China Passenger Car Association, CIC

Increasingly Diverse Industry Participants and Shift Toward Deeper Industry Collaboration

New-generation automakers in China are reorganizing R&D and operations around user needs, technology companies are leveraging ecosystem integration and expertise to extend beyond traditional boundaries, and established OEMs are transforming to meet the demands of Three Transformations. These efforts are shifting the industry from a production-focused model to a consumer-centric model.

With the continued advancement of Three Transformations in the automotive industry and the growing emphasis on consumer experience, OEMs are accelerating product iteration cycles. This trend has driven increasing demand for the early involvement of automotive component providers in joint R&D during the product development phase. Against this backdrop, Chinese automotive component providers, leveraging their continuously improving technological capabilities and rapid response capabilities, are increasingly participating in such early-stage development and evolving from traditional component providers into technology partners of OEMs.

Growing Competitiveness of China's Automotive Industry and Opportunities Arising from Globalization

Chinese branded OEMs have seized the opportunities presented by the Three Transformations, achieving significant gains in both market share and technological capabilities and establishing a strong global competitive position in the NEV market. China's NEV sales volume rose from 1.3 million units in 2020 to 13.0 million in 2024, and is expected to reach 30.9 million by 2030. Export volume of Chinese branded OEMs grew from 0.6 million units in 2020 to 3.9 million in 2024, representing a CAGR of 62.9%, and is projected to reach 7.7 million by 2030. The rise of Chinese branded OEMs provides Chinese component providers with extensive opportunities for technology validation and capacity expansion, accelerating technological iteration and scale growth, while also facilitating their overseas expansion and gradually challenging the long-standing dominance of international component suppliers. In turn, Chinese automotive component providers support Chinese branded OEMs by providing advanced and cost-effective components, enabling faster product development and enhancing vehicle competitiveness, thereby facilitating OEMs' expansion into international markets. This mutually reinforcing relationship further strengthens the global competitiveness of China's automotive industry.

As the global automotive value chain continues to deepen its specialization, supply chain globalization has become an irreversible trend. To address trade policy barriers, expand global market coverage and optimize manufacturing costs, leading global OEMs are continuously advancing their global production footprint while strengthening localized supplier ecosystems. This trend is driving core component manufacturers to simultaneously establish global operational networks to support OEMs' cross-regional and localized production needs and to ensure supply chain stability and responsiveness. Against this backdrop, component manufacturers lacking global deployment capabilities or responding slowly to the Three Transformations of the automotive industry may face declining competitiveness and pressure on market share, while companies with long-standing customer relationships and mature global operational capabilities are well positioned to capture additional market opportunities.

ANALYSIS OF GLOBAL AUTOMOTIVE COMPONENT INDUSTRY

Automotive components refer to the systems and parts that make up a vehicle, working together to ensure safety, comfort, energy efficiency and intelligent functionality. Key automotive components include vibration control systems, lightweight chassis systems, air suspension systems, interior and exterior functional components and thermal management systems.

Supply Model of the Automotive Component Industry

Traditional multi-tier supply systems

The automotive component industry features a long value chain with clear specialization, forming a multi-tier supply system comprising Tier 1, Tier 2 and lower-tier suppliers based on their roles with OEMs. In this system, OEMs lead the development of vehicle architecture, Tier 1 suppliers develop and supply components or systems, and Tier 2 and lower-tier suppliers provide materials and semi-finished products to support Tier 1.

Tier 0.5 collaborative supply system reshapes the automotive supply chain

With the deepening of Three Transformations, vehicle systems are becoming increasingly complex, making it difficult for a single system to achieve optimal performance. Therefore, OEMs prefer suppliers capable of multi-system collaboration, giving rise to the Tier 0.5 model. In this model, suppliers are involved early in vehicle product definition and platform architecture development, co-designing with OEMs and providing integrated solutions across components and systems, upgrading their role from single-system Tier 1 suppliers to full-vehicle collaborative partners. Tier 0.5 suppliers deliver differentiated value across several aspects:

- ***Significant increase in per-vehicle component value.*** Suppliers provide integrated solutions across components and systems, covering several product categories within a vehicle and creating cross-selling opportunities, increasing per-vehicle component value to several times that of the traditional model.
- ***Deep involvement in vehicle development for global optimization and innovation.*** Suppliers' early involvement enables coordinated design across multiple vehicle systems, enhancing development efficiency and market responsiveness. It also enables them to collaborate with OEMs on defining architectures and technology roadmaps for next-generation products, transforming the supplier relationship into a strategic innovation partnership.
- ***Significant improvement in overall supply chain efficiency.*** Establishing long-term strategic partnerships with Tier 0.5 suppliers enables OEMs to integrate multiple systems and product categories within a same vehicle, reduce the number of suppliers, lower management and communication costs, and enhance overall supply chain efficiency.
- ***Strengthened strategic collaboration and long-term competitive advantage.*** The Tier 0.5 model requires component providers to participate deeply in the entire vehicle development process, placing higher demands on system engineering capabilities, R&D collaboration efficiency, and rapid response mechanisms. These comprehensive requirements collectively create high barriers to entry, fostering long-term and stable partnerships between leading component manufacturers and OEMs.

Analysis of Global Automotive Chassis Industry

The automotive chassis is the core structural system that supports and integrates key vehicle assemblies, including the engine, body structure and electrical systems, while enabling functions such as power transmission, steering, braking and vibration absorption. It is a key determinant of vehicle safety, handling stability, vehicle weight optimization and ride comfort. Key automotive chassis components primarily include vibration control systems, lightweight chassis systems and air suspension systems:

- ***Vibration control systems.*** Vibration control systems use rubber-metal composite structures to isolate, attenuate and absorb vibrations, noise and shocks from the powertrain, suspension and transmission. Key products include powertrain mounts, aluminum brackets, bushings and crankshaft torsional dampers.

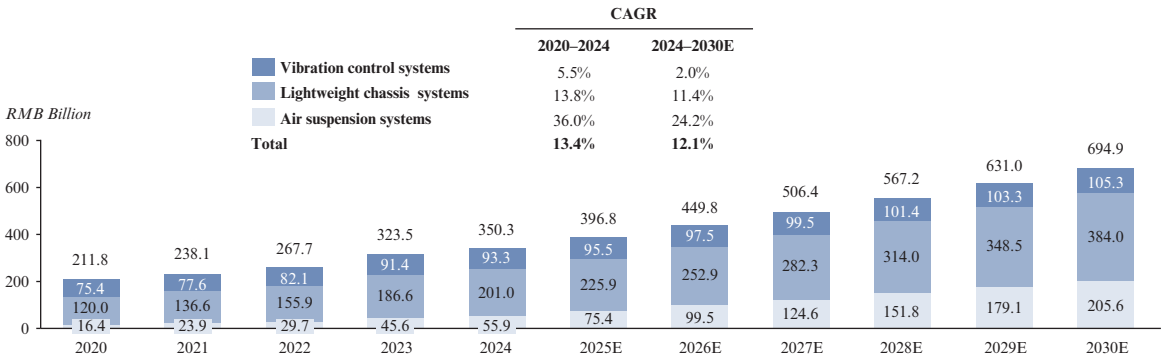
- ***Lightweight chassis systems.*** Lightweight chassis systems are designed to minimize chassis weight while maintaining strength and stability, achieved through process upgrades, material substitution and structural optimization. Key products include steering knuckles, control arms, subframes, brake assemblies and tie rods.

- ***Air suspension systems.*** Air suspension is an advanced suspension system that replaces steel coil springs with adjustable air springs. This system allows vehicles to adapt to road conditions while balancing comfort and stability.

Market size

Driven by the accelerating electrification and intelligence of vehicles, technological upgrades of chassis systems are underway, underpinning demand growth for vibration control systems, lightweight chassis systems and air suspension systems. The market size of global automotive vibration control system industry expanded from RMB75.4 billion in 2020 to RMB93.3 billion in 2024, and is projected to reach RMB105.3 billion by 2030. Similarly, the market size of global automotive lightweight chassis system industry expanded from RMB120.0 billion in 2020 to RMB201.0 billion in 2024, and is projected to reach RMB384.0 billion by 2030. Additionally, the market size of global automotive air suspension system industry expanded from RMB16.4 billion in 2020 to RMB55.9 billion in 2024, and is projected to reach RMB205.6 billion by 2030.

Market Size of Global Automotive Chassis Industry, in terms of Revenue, by Product, 2020–2030E



Sources: Expert interviews, industry publications and CIC

Key drivers and development trends

- ***Rising consumer demand for enhanced driving experience.*** As consumers seek greater precision in vehicle handling and adaptability to diverse road conditions, the demand for air suspension systems and vibration control systems has increased.

- ***Electrification creates demand for lightweighting.*** The need for large-capacity batteries in electric vehicles has significantly increased vehicle weight, impacting energy efficiency and range. This has accelerated the demand for lightweight chassis solutions.

- ***Continuous technological advancements.*** Technological innovation continues to enhance the performance of automotive chassis. Advances in controllers, sensors, and algorithms significantly enhance air suspension functionality. Simultaneously, the adoption of lightweight materials and integrated die-casting processes reduces component weight and simplifies structural design. In addition, developments in rubber formulations and simulation techniques strengthen vibration control systems, improving both durability and overall reliability.

- ***Mature supply chain drives cost reductions.*** Increasing standardization of components and expanding production capacity are generating economies of scale, gradually lowering material and manufacturing costs. This trend is enabling an increase in the per-vehicle adoption rate of chassis components.
- ***Expansion from single products to full-stack solutions.*** As suppliers gain deeper expertise in chassis technologies, they are shifting from offering standalone components to providing comprehensive full-stack chassis solutions. This transition enhances their ability to offer integrated supply capabilities, increases the per-vehicle component value, and strengthens customer relationships, further solidifying their strategic role within the supply chain.

Competitive landscape

Vibration control systems

In 2024, the Group achieved revenue of RMB2.9 billion from automotive vibration control systems, ranking second among Chinese providers and third among all providers globally, with a market share of 3.1%. The Group ranked third for two consecutive years, from 2023 to 2024.

Ranking of Automotive Vibration Control Systems Providers, in terms of Revenue, 2024

Ranking	Providers	Description	Revenue[(1)] *(RMB billion)*	Market share *%*
1	Company A	A private company founded in 2001 and headquartered in Germany. It is mainly engaged in the R&D, manufacturing and sales of automotive vibration control systems and air suspension systems.	~37.0	~39.6%
2	Company B	A public company founded in 1980, listed on the Shenzhen Stock Exchange, and headquartered in Anhui, China. It is mainly engaged in the R&D, manufacturing and sales of automotive vibration control systems.	~4.1	~4.4%
3	**The Group**	—	**2.9**	**~3.1%**
4	Company C	A private company founded in 1966, and headquartered in the United States. It is mainly engaged in the R&D, manufacturing and sales of automotive components including suspension and vibration control systems.	~2.5	~2.7%
5	Company D	A private company founded in 1853 and headquartered in France. It is mainly engaged in the R&D, manufacturing and sales of automotive vibration control systems.	~2.0	~2.1%
		Sub-total	~48.5	~51.9%

Note:

(1) Includes global revenue from automotive vibration control systems such as powertrain mounts, aluminum brackets, bushings and crankshaft torsional dampers. Therefore, the Group's revenue from vibration control systems excludes revenue from certain body structural component products for ranking purposes, and as a result, is lower than its corresponding segment revenue.

Source: Publicly disclosed information of listed companies, Expert interviews, Industry publications, CIC

Lightweight chassis systems

In 2024, the Group achieved revenue of RMB8.2 billion from automotive lightweight chassis systems, ranking first among all providers globally, with a market share of 4.1%. The Group ranked first for two consecutive years, from 2023 to 2024.

Ranking of Automotive Lightweight Chassis Systems Providers, in terms of Revenue, 2024

Ranking	Providers	Description	Revenue[(1)] *(RMB billion)*	Market share *%*
1	**The Group**	—	**8.2**	**~4.1%**
2	Company E	A private company founded in 1988 and headquartered in Hebei, China. It is mainly engaged in the R&D, manufacturing and sales of aluminum alloy automotive components.	~6.5	~3.2%
3	Company F	A public company founded in 2000, listed on the Shenzhen Stock Exchange, and headquartered in Guangdong, China. It is mainly engaged in the R&D, manufacturing and sales of aluminum alloy automotive components.	~6.0	~3.0%
4	Company G	A public company founded in 1998, listed on the Shanghai Stock Exchange, and headquartered in Guangdong, China. It is mainly engaged in the R&D, manufacturing and sales of aluminum alloy automotive structural components.	~4.3	~2.1%
5	Company H	A public company founded in 1993, listed on the Shenzhen Stock Exchange, and headquartered in Jiangsu, China. It is mainly engaged in the R&D, manufacturing and sales of magnesium alloy and aluminum alloy automotive components.	~4.0	~2.0%
		Sub-total	~29.0	~14.4%

Note:

(1) Includes global revenue from lightweight chassis systems manufactured using lightweight metals such as high-strength steel, ultra-high-strength steel, aluminum and magnesium alloys, including front and rear steel-aluminum-magnesium subframes, control arms and steering knuckles.

Source: Publicly disclosed information of listed companies, Expert interviews, Industry publications, CIC

Air suspension systems

In 2024, the Group achieved revenue of RMB1.2 billion from automotive air suspension systems, ranking second among Chinese providers and fourth among all providers globally, with a market share of 2.2%.

Ranking of Automotive Air Suspension Systems Providers, in terms of Revenue, 2024

Ranking	Providers	Description	Revenue[(1)] *(RMB billion)*	Market share *%*
1	Company A	A private company founded in 2001 and headquartered in Germany. It is mainly engaged in the R&D, manufacturing and sales of automotive NVH solutions and air suspension systems.	~7.5	~13.4%
2	Company I	A public company founded in 1871, listed on the Frankfurt Stock Exchange, and headquartered in Germany. It is mainly engaged in the R&D, manufacturing and sales of automotive components including air suspension systems.	~6.5	~11.6%
3	Company J	A private company founded in 2018 and headquartered in Zhejiang, China. It is mainly engaged in the R&D, manufacturing and sales of automotive suspension systems and air suspension technologies.	~1.7	~3.0%
4	**The Group**	—	**1.2**	**~2.2%**
5	Company K	A public company founded in 1997, listed on the Shanghai Stock Exchange, and headquartered in Shanghai, China. It is mainly engaged in the R&D, manufacturing and sales of automotive components including air suspension systems.	~0.9	~1.6%
		Sub-total	~17.8	~31.8%

Note:

(1) Includes global revenue from automotive air suspension systems.

Source: Publicly disclosed information of listed companies, Expert interviews, Industry publications, CIC

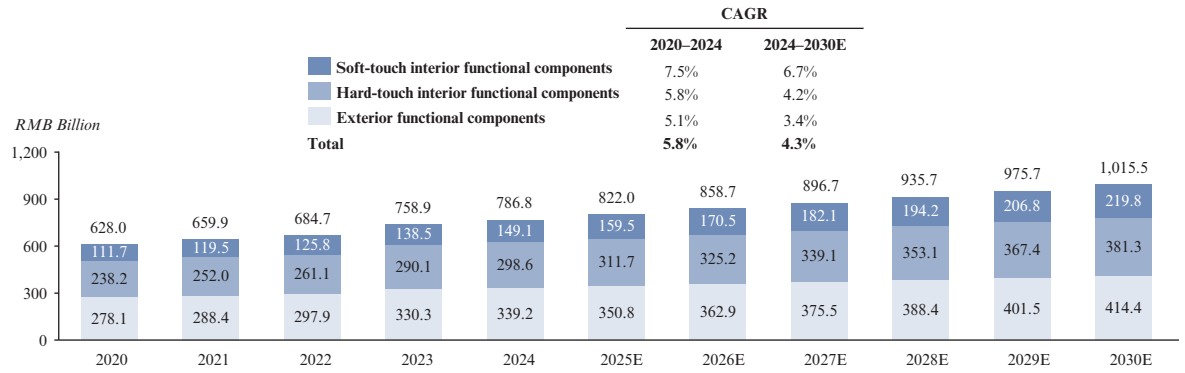
Analysis of Global Automotive Interior and Exterior Functional Component Industry

Automotive interior and exterior functional components are essential parts used for both interior and exterior decoration, closely tied to vehicle functionality and safety. These components are categorized into automotive interior functional components and automotive exterior functional components. Soft-touch interior functional components include materials like headliners, carpets and soundproofing, while hard-touch interior functional components consist of parts such as dashboards, door panels and seat backs. Automotive exterior functional components encompass bumpers, mirrors, spoilers, seals and decorative strips, which serve both esthetic and protective roles.

Market size

The growing consumer demand for driving experience and personalized features is driving the automotive interior and exterior functional component industry toward higher quality and greater value. In terms of revenue, the global market size of the automotive interior and exterior functional component industry expanded from RMB628.0 billion in 2020 to RMB786.8 billion in 2024, and is projected to reach RMB1,015.5 billion by 2030. The market size of automotive soft-touch interior functional components grew from RMB111.7 billion in 2020 to RMB149.1 billion in 2024, and is projected to reach RMB219.8 billion by 2030.

Market Size of Global Automotive Interior and Exterior Functional Component Industry, in terms of Revenue, by Product, 2020–2030E



Sources: Expert interviews, industry publications and CIC

Key drivers and development trends

- ***Upgraded consumer demand drives both volume and value growth.*** As consumers increasingly view cars as mobile living spaces, their demand for enhanced comfort and personalization has led to more and higher-quality interior and exterior functional components, thereby driving sustained growth in per-vehicle component value of interior and exterior functional components.
- ***Fundamental shift in the positioning and functionality of automotive interior and exterior functional components.*** With the rise of automotive intelligence and connectivity, interior and exterior functional components are transforming from basic functional parts into interactive smart interfaces that integrate sensors and electronics, enabling personalized user experiences through touch, voice, or gesture controls.
- ***Ongoing material innovation.*** Advances in materials technology are pushing automotive interior and exterior functional components towards lighter and more eco-friendly designs, with materials like carbon fiber reducing weight and improving energy efficiency and range.
- ***Accelerating industry consolidation favoring leading players.*** The highly competitive automotive interior and exterior functional component industry is experiencing consolidation, with leading suppliers merging and acquiring to integrate technology and resources, enabling them to offer comprehensive solutions and expand market share through scale, technological integration, and global supply networks.

Competitive landscape of global automotive soft-touch interior functional components industry

In 2024, the Group achieved revenue of RMB8.4 billion from automotive soft-touch interior functional components, ranking first among Chinese providers and fourth among all providers globally, with a market share of 5.7%.

Ranking of Automotive Soft-touch Interior Functional Components Providers, in terms of Revenue, 2024

Ranking	Providers	Description	Revenue[(1)] *(RMB billion)*	Market share *%*
1	Company L	A public company founded in 2011, listed on the SIX Swiss Exchange, and headquartered in Switzerland. It is mainly engaged in the R&D, manufacturing and sales of automotive interior functional components and acoustic management solutions.	~11.5	~7.7%
2	Company M	A private company founded in 1969 and headquartered in Germany. It is mainly engaged in the R&D, manufacturing and sales of automotive interior functional components.	~10.8	~7.2%
3	Company N	A public company founded in 1918, listed on the Tokyo Stock Exchange, and headquartered in Japan. It is mainly engaged in the R&D, manufacturing and sales of automotive interior functional and seating components.	~9.5	~6.4%
4	**The Group**	—	**8.4**	**~5.7%**
5	Company O	A public company founded in 1986, listed on the Shanghai Stock Exchange, and headquartered in Shanghai, China. It is mainly engaged in the R&D, manufacturing and sales of automotive interior materials and interior functional components.	~8.4	~5.6%
		Sub-total	~48.6	~32.6%

Note:

(1) Includes global revenue from automotive soft-touch interior functional components such as carpets, headliners, sun visors, trunk mats, parcel shelves, acoustic and thermal insulation pads and trunk trim components, excluding automotive seat products.

Source: Publicly disclosed information of listed companies, Expert interviews, Industry publications, CIC

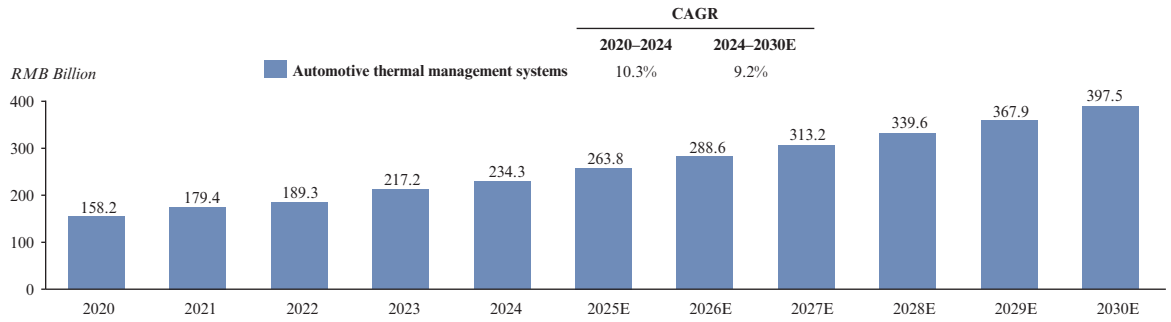
Analysis of Global Automotive Thermal Management System Industry

Automotive thermal management systems are essential components that regulate the temperature of key vehicle systems, such as the powertrain, battery and air conditioning, ensuring efficiency, safety and comfort. These systems manage heating, cooling and heat dissipation, playing a crucial role in the transition to electric and intelligent vehicles. The core components of automotive thermal management systems include integrated assemblies, automotive valves, pumps and heat exchangers. Integrated assemblies combine multiple components including integrated heat pump units; automotive valves include multi-way and electronic expansion valves; pumps include electronic water pumps; and heat exchangers include condensers and evaporators.

Market size

As the global penetration of new energy vehicles continues to rise, coupled with increasing demands from OEMs for improved range optimization and thermal efficiency management, the global market is expected to grow steadily. In terms of revenue, the market size of global automotive thermal management system industry expanded from RMB158.2 billion in 2020 to RMB234.3 billion in 2024, and is projected to reach RMB397.5 billion by 2030.

Market Size of Global Automotive Thermal Management System Industry, in terms of Revenue, 2020–2030E



Sources: Expert interviews, industry publications and CIC

Key drivers and development trends

- ***Development of new energy vehicles drives the demand of thermal management systems.*** Compared to traditional internal combustion engine vehicles, new energy vehicles introduce new core thermal management scenarios such as batteries, motors, and electronic control, significantly increasing the value of per-vehicle thermal management systems and directly driving sustained industry demand growth.
- ***Improved automotive intelligence increases thermal management system value.*** As smart cockpits and advanced driver assistance systems become more widespread, the increase in in-vehicle computing platforms and power electronics loads has led to a significant rise in overall vehicle heat generation, creating higher demands for thermal management systems.
- ***Trend toward system integration.*** Thermal management systems are evolving towards more centralized functions and integrated components. By combining multiple independent temperature control functions into a unified assembly, these systems reduce size and weight, while also lowering assembly complexity and system costs, aligning with the lightweight development trend of automotive industry.
- ***Cross-industry business expansion opens growth opportunities.*** Leveraging core technologies and R&D capabilities accumulated in temperature control and heat dissipation, automotive thermal management companies are gradually expanding into sectors outside the automotive industry. Emerging areas such as data centers, energy storage liquid cooling and humanoid robots have an urgent need for efficient heat dissipation, becoming significant cross-industry expansion directions.

Competitive landscape

In 2024, the Group achieved revenue of RMB2.1 billion from thermal management systems, ranking third among all Chinese providers, with a market share of 0.9%.

Ranking of Chinese Automotive Thermal Management System Providers, in terms of Revenue, 2024

Ranking	Providers	Description	Revenue[(1)] *(RMB billion)*	Market share *%*
1	Company P	A public company founded in 1994, listed on the Shenzhen Stock Exchange, and headquartered in Zhejiang, China. It is mainly engaged in the R&D, manufacturing and sales of automotive thermal management systems and components.	~11.4	~4.9%
2	Company Q	A public company founded in 1999, listed on the Shenzhen Stock Exchange, and headquartered in Zhejiang, China. It is mainly engaged in the R&D, manufacturing and sales of automotive heat exchangers and thermal management systems.	~11.3	~4.8%
3	**The Group**	—	**2.1**	**~0.9%**
4	Company R	A public company founded in 2002, listed on the Shenzhen Stock Exchange, and headquartered in Jiangsu, China. It is mainly engaged in the R&D, manufacturing and sales of automotive air conditioning compressors and thermal management systems.	~1.2	~0.5%
5	Company S	A public company founded in 1992, listed on the Shanghai Stock Exchange, and headquartered in Shanghai, China. It is mainly engaged in the R&D, manufacturing and sales of automotive components including thermal management systems.	~1.0	~0.4%
		Sub-total	~27.0	~11.5%

Note:

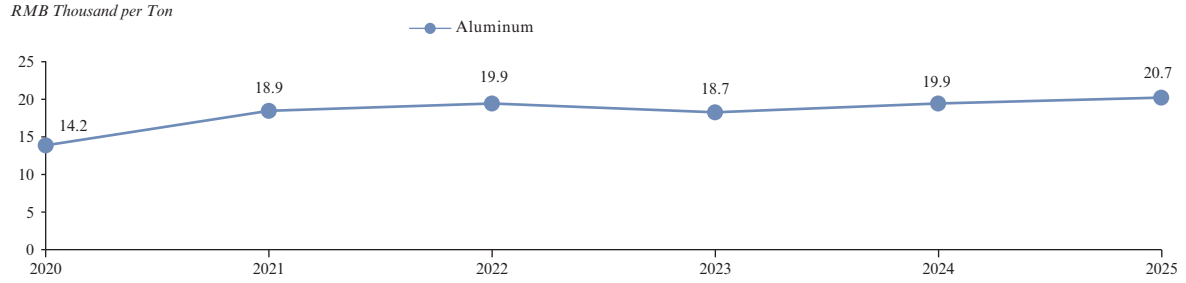
(1) Includes global revenue from automotive thermal management system such as integrated assemblies, automotive valves, pumps and heat exchangers.

Source: Publicly disclosed information of listed companies, Expert interviews, Industry publications, CIC

Analysis of Raw Material Price Fluctuations

The core raw materials for the automotive component industry primarily include aluminum and natural rubber. Affected by macroeconomic conditions, supply-demand dynamics, and energy prices, the prices of these raw materials experienced fluctuations between 2020 and 2025 but remained within a relatively stable range overall. For example, aluminum prices increased during 2020 to 2021, driven by post-pandemic economic recovery and energy supply constraints, and remained relatively stable from 2022 to 2024. In 2025, aluminum prices increased driven by sustained demand and supply shortages. Fluctuations in aluminum prices have a direct impact on the cost of automotive components, particularly lightweight chassis systems and body structural components, which are largely composed of aluminum castings. When aluminum procurement costs rise, component manufacturers typically adjust pricing mechanisms to partially pass on the increased costs to OEMs, thereby driving up component prices.

Spot Price of Aluminum, 2020–2025



Sources: Shanghai Futures Exchange, CIC

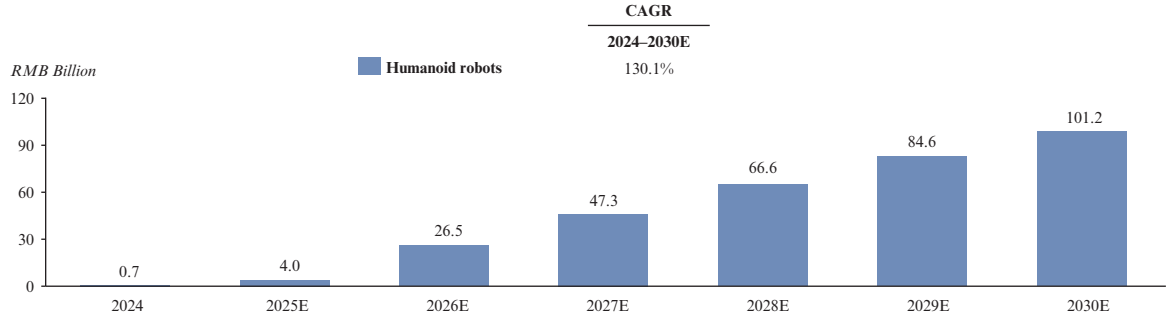
Entry Barriers in Global Automotive Component Industry

- ***Technical barriers.*** As OEMs continue to raise performance requirements for automotive components, the complexity and comprehensiveness of R&D have significantly increased. Leading companies have developed multidisciplinary R&D capabilities and established advanced research and testing centers, creating significant technical barriers.
- ***Customer certification and loyalty barriers.*** Automotive OEMs use rigorous quality management systems to select component providers, with long cycles and complex processes. Once partnerships are formed, high customer stickiness is maintained to ensure supply chain stability, further raising entry barriers for new entrants.
- ***Global manufacturing footprint and intelligent manufacturing barriers.*** Global capacity investment is substantial and has long construction periods, requiring forward planning to meet OEMs' mass delivery needs. Additionally, automotive-grade products demand strict performance standards, making intelligent manufacturing crucial for efficient and precise production. New entrants face challenges in meeting these requirements.
- ***Capital and scale barriers.*** To ensure product performance and meet mass delivery needs, automotive component suppliers must continually invest heavily in R&D, capacity expansion, equipment and plant construction. Moreover, companies must achieve significant production scale to benefit from economies of scale through bulk procurement and manufacturing cost reduction. New entrants struggle to quickly build such scale advantages, putting them at a competitive disadvantage.

ANALYSIS OF GLOBAL HUMANOID ROBOTIC COMPONENT INDUSTRY

The humanoid robot industry is entering a phase of rapid growth. Driven by a combination of demand, technology and policy factors, the humanoid robot industry is rapidly transitioning from the technology exploration phase to large-scale growth. The global aging population, labor shortages and rising labor costs in major economies are driving an increasing demand for humanoid robots that can adapt to various scenarios and perform human-like tasks. At the same time, advancements in embodied intelligence, along with breakthroughs in flexible joint drives, control systems and precision dexterous hands, are greatly enhancing robots' ability to perceive their environment, make autonomous decisions and execute tasks with precision, thereby laying a strong foundation for commercialization. Moreover, supportive policies, the development of industry standards and the expansion of application scenarios in different countries are creating a favorable environment for large-scale industry deployment. In terms of revenue, the global humanoid robot market is expected to reach RMB0.7 billion in 2024 and grow to RMB101.2 billion by 2030, with a CAGR of 130.1%.

Market Size of Global Humanoid Robot Industry, in terms of Revenue, 2024–2030E



Sources: Expert interviews, industry publications and CIC

Components are the foundation of humanoid robots, essential in transitioning the industry from technical feasibility to commercial viability. Their technological maturity directly influences industry development. These components provide the physical structure and motion accuracy required by robots, supporting their mobility, environmental adaptability and task execution accuracy, all critical for human-like movement and complex task execution. Advances in core technology and cost control are key to scaling humanoid robot applications. Efficient supply of these components is crucial to overcoming supply constraints, building a complete ecosystem and supporting rapid industry growth.

Definition

Humanoid robotic components are the core elements that enable the robot's movement and interaction with its environment. They perform critical functions such as power transmission, motion execution and environmental sensing. These components can be categorized into rotary actuators, linear actuators, dexterous hand actuators, flexible skin and other structural parts. Among these, actuators are the most critical components, converting electrical signals into mechanical motion to precisely control joints and moving parts. The actuator assembly accounts for approximately 50% to 70% of the total BOM hardware cost of humanoid robots.

Classification of Key Humanoid Robotic Components and BOM Cost Breakdown, by Component, 2024

Component Category	Key Components and Core Functions	Cost Share
Rotary actuators	• Includes harmonic reducers, torque sensors and motors • Suitable for rotary motion scenarios in humanoid robots, enabling flexible movement of key joints such as shoulders, elbows and hips, ensuring precision and stability in limb movement and posture adjustment	25%~30%
Linear actuators	• Includes motors, planetary roller screws and torque sensors • Applied in linear motion scenarios such as limb extension and contraction, providing power support and precise control for leg extension during walking and arm flexion movements	20%~25%
Dexterous hand actuators	• Includes motors, worm gears and housings • Applied in fine manipulation and grasping scenarios, enabling delicate and compliant interaction with the physical world	5%~15%

Component Category	Key Components and Core Functions	Cost Share
Flexible skin	• Includes flexible substrates and tactile sensors • Capable of sensing pressure, shear force and contact force, enabling more refined manipulation by robotic hands	5%~10%

Source: Expert interviews, industry publications and CIC

Key Drivers and Development Trends

- ***Technology development drives performance upgrades.*** The coordinated development of AI control algorithms, precision manufacturing and new materials has driven significant improvement in the performance of humanoid robot components, providing a solid technical foundation for the scale-up of industry.
- ***Expansion of downstream application scenarios drives demand growth.*** As technology continues to evolve, humanoid robots are extending beyond traditional industrial applications into areas such as education, entertainment, emergency rescue, medical services and logistics, leading to a surge in demand for humanoid robotic components.
- ***Supportive policies.*** Governments globally are prioritizing the development of humanoid robotic components, implementing supportive policies to create a favorable industry environment. In China, in 2024, the Ministry of Industry and Information Technology issued the "Implementation Opinions on Promoting Future Industry Innovation" (《關於推動未來產業創新發展的實施意見》), to support the development of core humanoid robotic components. At the international level, in 2024, the European Union passed the "Horizon Europe plan (2025–2027)", which allocated public funding for foundational research and development of dexterous hands.
- ***Deepened industry collaboration.*** Core component suppliers are strengthening collaboration with upstream and downstream companies through joint R&D and process coordination, enhancing supply chain stability, achieving precise cost control, and supporting the large-scale development of the industry.
- ***Rising competitiveness of Chinese providers.*** Chinese humanoid robotic component providers have gained advantages from strong supply chain synergies and the shared industrial foundation between humanoid robots and new energy vehicles. Building on this foundation, they have overcome technological barriers, enhanced product precision and responsiveness and leveraged advantages in mass production and scale, enabling them to integrate into global humanoid robot manufacturer supply chains and significantly enhance market competitiveness.

Competitive Landscape

The global humanoid robot market remains at an early stage of commercialization, currently characterized by small-batch deliveries and the absence of a mature and stable industry competitive landscape. At this stage, industry development is primarily led by a few leading technology companies, including Tesla, Boston Dynamics, Unitree Robotics, UBTECH Robotics and AgiBot, which are actively advancing technological development and pursuing scalable production. Given that the commercialization of humanoid robots is still at an early stage, the humanoid robotic component industry has yet to form a stable competitive landscape, and remains fragmented with no clear market leaders. The primary players in the market include automotive component providers,

which are leveraging their existing technologies and expertise to cross over into humanoid robotic component market, as well as emerging startups, both actively exploring opportunities in this rapidly evolving industry.

Entry Barriers

- ***Technological barriers.*** The design and manufacturing of humanoid robotic components involve interdisciplinary fields such as mechanical design, electronic engineering and material science. Therefore, new entrants lacking sufficient technical reserves and innovation capabilities are unlikely to master the core technologies of humanoid robotic components.
- ***Capital barriers.*** The humanoid robotic components industry requires substantial investment to support technological R&D, large-scale production and product iteration. Leading component providers invest heavily in R&D and production, creating significant capital barriers.
- ***Customer resource barriers.*** As the humanoid robot industry is still in the exploration phase, component manufacturers need to collaborate deeply with humanoid robot OEMs in R&D and testing to ensure the stability of core component performance. First-mover market participants can establish a customer base and quickly expand market share.
- ***Talent barriers.*** Humanoid robotic components are a technology-intensive industry, and leading providers have teams with both solid theoretical foundations and extensive practical experience. However, professionals with specialized knowledge in humanoid robotic components are relatively scarce, and the talent development cycle is long.

SOURCE OF INFORMATION

In connection with the [REDACTED], we engaged CIC, an independent market research consultant, to conduct an analysis of and prepare a report about the global automotive component and humanoid robotic component industries. The CIC Report has been prepared by CIC independent of the influence of our Group and other interested parties. We have agreed to pay CIC a total fee of RMB500,000 for the preparation and use of the CIC Report, and we believe that such fees are consistent with the market rate. CIC is a consulting firm founded in Hong Kong and provides professional industry consulting services across multiple industries. CIC's services include industry consultancy services, commercial due diligence and strategic consulting.

CIC conducted both primary and secondary research using a variety of resources. Primary research involved interviewing key industry experts and leading industry participants. Secondary research involved analyzing data from various publicly available data sources. The market projections in the commissioned report are based on the following key assumptions: (i) given China's enduringly stable political system, effective social governance and robust economic foundation, it is anticipated that the overall social, economic and political environments in China will remain stable during the forecast period; (ii) according to the National Bureau of Statistics of China, key economic indicators such as gross domestic product, industrial added value and urbanization rate have shown an upward trend in China over the past decade. Therefore, we believe that the economic and industry development in China is likely to maintain a steady growth trajectory during the forecast period, accompanied by continuing urbanization; (iii) related key industry drivers such as the transformation of the automotive sector toward Three Transformations, the growing consumer demand for enhanced driving experience, the continuous technological advancements, the global aging population, labor shortages and rising labor costs in major economies and the favorable policy support from governments worldwide are likely to propel continued growth in global automotive component industry and global humanoid robotic component industry throughout the forecast period; and (iv) there will be no extreme force majeure event or unforeseen industry regulation that may significantly or fundamentally affect the relevant market and industry.

INDUSTRY OVERVIEW

Unless otherwise specified, all data and forecasts contained in this section are derived from the consultancy report of CIC. The Directors, upon acting with reasonable prudence, confirmed that there has been no occurrence of adverse change in the overall market information that would subject the data to significant restrictions, contradiction or negative effects since the date of the consultancy report.