

Confidential

# Independent Market Research on Global High-precision Intelligent Manufacturing Platform Industry



All the information contained herein (including without limitation data, words, charts and pictures) is the sole property of Frost & Sullivan, treated as highly confidential document, unless otherwise expressly indicated the sources in the report. Should no one copy, reproduce, diffuse, publish, quote, adapt, compile all or any part of the report without the written consent of Frost & Sullivan. In the event of the violation of the above stipulation, Frost & Sullivan reserve the right of lodging claim against the relevant persons for all the losses and damages incurred.

Date: June 17, 2026

For and on behalf of Frost & Sullivan (Beijing) Inc., Shanghai  
Branch Co.

Name: Terry Tse

Title: Consulting Director



# Agenda

- 1 Overview of Global High-precision Intelligent Manufacturing Platform Industry for Core Electronic Devices
- 2 Overview of Global High-precision Intelligent Manufacturing Platform Industry for Intelligent Vehicles And Advanced Air Mobility
- 3 Raw Material Price Analysis
- 4 Appendix



## Overview of Global High-precision Intelligent Manufacturing Platform Industry For Core Electronic Devices

### Overview

Upgrading in product demand is driving electronic device manufacturers to enhance core competencies, as diversified applications require higher precision, stability, and iteration speed. This promotes production toward higher standards, efficiency, technological sophistication, and flexibility with lean, digitalized, automated, and green production systems enabling rapid multi-category switching and consistent quality, while globalized operations and scale become essential for adapting to the fast-evolving electronic device industry.

Electronic device development is underpinned by shared core technologies, enabling cross-category synergy. Although electronic devices span diverse domains such as consumer, industrial, and computing applications with varying product forms and use cases, the underlying technologies share significant commonality. These foundational capabilities can be replicated and optimized across product categories. Manufacturers equipped with high-precision intelligent manufacturing platforms for electronic devices can leverage existing technologies to adapt to new product lines, significantly reducing R&D costs and cycles. Through standardization of hardware modules and platformization of manufacturing systems, such firms achieve efficient resource integration and capacity optimization, fostering cross-category synergy and sustainable growth across the ecosystem.

# Overview of Global High-precision Intelligent Manufacturing Platform Industry For Core Electronic Devices

## Definition of High-Precision Intelligent Manufacturing Platform Industry for Core Electronic Devices

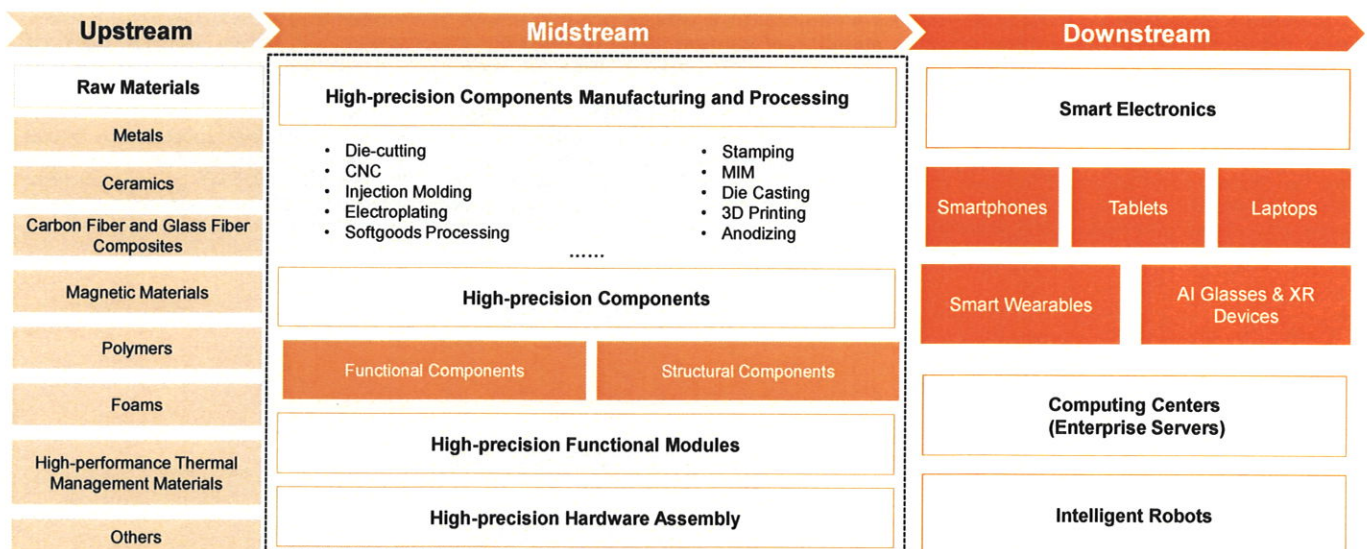
The high-precision intelligent manufacturing platform industry for core electronic devices refers to an integrated manufacturing system that serves smart electronics, computing centers (enterprise servers), and intelligent robots, combining advanced intelligent manufacturing processes, such as high-precision components manufacturing and processing, rapid prototyping technologies, and automatic control technologies, with digital production management. In this context, "high-precision" specifically refers to the use of advanced processing technologies to achieve strict and consistent control over component dimensions, geometry, positional accuracy, surface quality, and material properties, thereby enabling the manufacturing of components with high accuracy, high quality, and high stability. Companies in this industry focus on the design, production, and processing of high-precision components, which can be categorized into functional components and structural components. Functional components are parts that realize core functions under complex operating conditions, including bonding, cushioning, thermal management, sealing, electrical conduction, electromagnetic shielding, and insulation. Structural components are parts that provide mechanical support, positioning, and protection for internal modules, such as frames, brackets and enclosures. Through automation, intelligent quality control, and flexible scheduling, manufacturers achieve efficient, stable, and scalable production. These capabilities enable downstream products to meet the requirements for lightweight design, durability, thermal management, and multi-functional integration, making high-precision hardware a key enabler of core electronic device development.

High-Precision intelligent manufacturing platform industry is defined by a combination of measurable and operational criteria, as set forth below:

- **High-precision manufacturing capability:** possessing advanced high-precision processing technologies, including but not limited to die-cutting, stamping, CNC machining, metal injection molding (MIM), injection molding, die casting, electroplating, 3D printing, softgoods processing, forging and anodizing, with the ability to meet strict dimensional accuracy and consistency requirements.
- **Product-oriented business model:** primarily engaged in the design, production, processing and sale of high-precision hardware products, including high-precision functional components and/or structural components and related high-precision functional modules, with industry scope defined based on revenue of product sales rather than manufacturing service or contract processing fees.
- **Platformised manufacturing capabilities:** operating integrated and scalable manufacturing platforms that support multi-process coordination, standardized quality control and intelligent production management, enabling efficient mass production and modular collaboration.

# Overview of Global High-precision Intelligent Manufacturing Platform Industry For Core Electronic Devices

## Value Chain Analysis of High-Precision Intelligent Manufacturing Platform Industry for Core Electronic Devices (1/2)



# Overview of Global High-precision Intelligent Manufacturing Platform Industry For Core Electronic Devices

## Value Chain Analysis of High-Precision Intelligent Manufacturing Platform Industry for Core Electronic Devices (2/2)

The upstream of the industry mainly consists of raw materials used in high-precision hardware manufacturing, including metals (e.g., aluminum alloy, stainless steel), ceramics (e.g., ceramic powder), carbon fiber and glass fiber composites, magnetic materials, polymers, foams, graphite, optical films, and high-performance thermal management materials (e.g., metal-based composites, graphene, and silicone). These materials ensure lightweight design, heat dissipation, strength, and durability.

The midstream of the industry is the manufacturing of high-precision hardware. Within it, high-precision components include functional components and structural components, with the former emphasizing performance and reliability, and the latter focusing on lightweight design, strength, and appearance. Leading companies in this sector possess advanced processing technologies such as die-cutting, stamping, computer numerical control (CNC), metal injection molding (MIM), injection molding, die casting, electroplating, 3D printing, softgoods processing, forging, and anodizing. Through self-developed numerical control equipment and the construction of automated production lines, these companies continuously improve manufacturing precision, efficiency, and yield rates. Meanwhile, some leading companies have extended their business into high-precision functional modules, key materials, and hardware assembly, gradually achieving vertical integration across the entire industry chain and building one-stop intelligent manufacturing platforms.

The downstream of the industry includes the core application scenarios, such as smart electronics, computing centers (enterprise servers), and intelligent robots. Leading companies in the sector adhere to a customer-centric service philosophy, maintaining long-term and stable strategic partnerships with globally-renowned downstream brands and backend equipment suppliers such as server manufacturers. They also participate deeply in customers' early-stage product development across multiple dimensions, including manufacturing processes, production facilities, technical R&D, and project management, securing sustained and stable orders from major clients.

# Overview of Global High-precision Intelligent Manufacturing Platform Industry For Core Electronic Devices

## Market Drivers and Developing Trends Analysis of Global High-Precision Intelligent Manufacturing Platform Industry for Core Electronic Devices (1/2)

**Innovative AI Powered Devices Reshape the Value Proposition of the Smart Electronics Industry**

- The smart electronics market is showing a moderate recovery, driven by foldable devices, AI glasses, and XR devices, which are accelerating the upgrade of high-precision hardware technologies and shifting competition from cost and efficiency toward forward-looking technology reserves and collaborative innovation.
- Foldable Devices: Leveraging their high technical barriers and high-value-added nature, foldable devices have become a new growth driver and a significant development opportunity in the smartphone market. By integrating flexible displays, multi-axis hinges, and support layers, they enable screen folding while imposing higher requirements on structural components such as display supports, hinge parts, rotary modules, and lightweight high-strength materials. As adoption accelerates, companies with capabilities in precision hinge machining, CNC processing, stamping, MIM, and automated assembly are poised for sustained growth.
- AI Glasses: Merging AI technology with traditional eyewear, AI glasses offer features such as real-time voice interaction, image recognition, and navigation, providing convenient, intelligent experiences and are expected to see sustained growth. These products integrate cameras, sensors, and display modules while requiring on-device AI computing and local inference within a lightweight form factor, placing higher demands on manufacturers' capabilities in thermal management, precision structural components, and functional module integration. Their emergence is accelerating the development of precision and modular manufacturing systems and raising technical thresholds across the industry.

**Computing Power Surge Drives Growth of Enterprise Servers**

- Driven by the rapid expansion of large-scale AI training and inference, global computing demand is surging, prompting hyperscale cloud service providers to accelerate the deployment of high-power data centers and driving global data center capital expenditure from approximately USD450 billion in 2024 to over USD3 trillion by 2030. Rising power consumption of commercial server chips, together with increasingly stringent energy-efficiency regulations for AI data centers across major regions, is accelerating the transition from traditional air cooling to liquid cooling solutions. At the same time, rack-level power density has increased from below 10 kW to over 120 kW, substantially boosting demand for server thermal management systems and power modules. As AI computing centers impose higher requirements on precision manufacturing, thermal performance, and long-term reliability, manufacturers with early technological leadership in high-precision server hardware are well positioned to secure first-mover advantages amid the continued expansion of the enterprise server market.

# Overview of Global High-precision Intelligent Manufacturing Platform Industry For Core Electronic Devices

## Market Drivers and Developing Trends Analysis of Global High-Precision Intelligent Manufacturing Platform Industry for Core Electronic Devices (2/2)

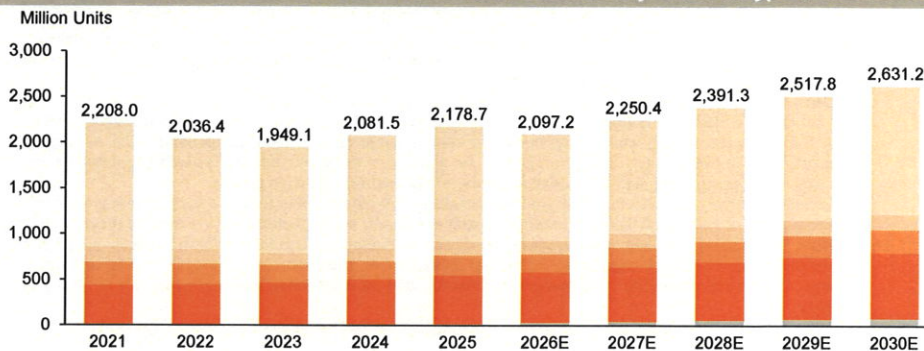
Expansion of Intelligent Robotics Applications Drives Upgraded Demand for High-Precision Hardware

- Empowered by continuous advancements in large AI models, intelligent robots are rapidly expanding into industrial, professional service, and consumer scenarios, driven by increasingly realistic perception and interaction capabilities, ergonomic structural design, and natural, fluid motion performance. Notably, improvements in the performance, stability, and safety of humanoid robots, combined with rising global labor costs and accelerating industrial automation, are fueling robust market growth. Global shipment volume of humanoid robots was approximately 8,000 units in 2024 and is forecast to grow to 500,000 units in 2029, representing a CAGR of 132.9% from 2025 to 2029. The widespread application of intelligent robots will directly drive demand for related high-precision component products, while also placing higher demands on manufacturers for lightweight design, durability, and modular design capabilities. Through the integration capability of high-precision components and functional modules, companies can support the stability, precision, and operational reliability of intelligent robots during operation, thereby supporting the continuous evolution and technological upgrading of the intelligent robotics industry.

# Overview of Global High-precision Intelligent Manufacturing Platform Industry For Core Electronic Devices

## Market Size of Global High-Precision Intelligent Manufacturing Platform Industry for Smart Electronics

Shipment Volume of Global Smart Electronics, Classified by Product Types, 2021-2030E



	2021	2022	2023	2024	2025	2026E	2027E	2028E	2029E	2030E	CAGR 2021-2025	CAGR 2026E-2030E
Smartphones	1,354.8	1,205.9	1,164.1	1,238.8	1,260.3	1,172.1	1,242.4	1,305.8	1,360.6	1,405.5	-1.8%	4.6%
of which, Foldable Devices	7.1	14.2	18.3	23.8	26.2	30.7	38.4	47.8	59.3	73.2	38.6%	24.3%
Tablets	168.8	161.6	128.5	140.1	153.8	144.6	154.0	162.3	169.3	174.7	-2.3%	4.8%
Laptops	250.3	226.3	192.7	201.2	218.0	198.4	215.3	228.2	238.5	249.2	-3.4%	5.9%
Smart Wearables	422.9	433.5	454.9	491.9	532.1	549.6	593.2	635.8	678.4	720.1	5.9%	7.0%
AI Glasses and XR Devices	11.2	9.1	8.9	9.6	14.5	32.5	45.5	59.2	71.0	81.7	6.7%	25.9%
Total	2,208.0	2,036.4	1,949.1	2,081.5	2,178.7	2,097.2	2,250.4	2,391.3	2,517.8	2,631.2	-0.3%	5.8%

# Overview of Global High-precision Intelligent Manufacturing Platform Industry For Core Electronic Devices

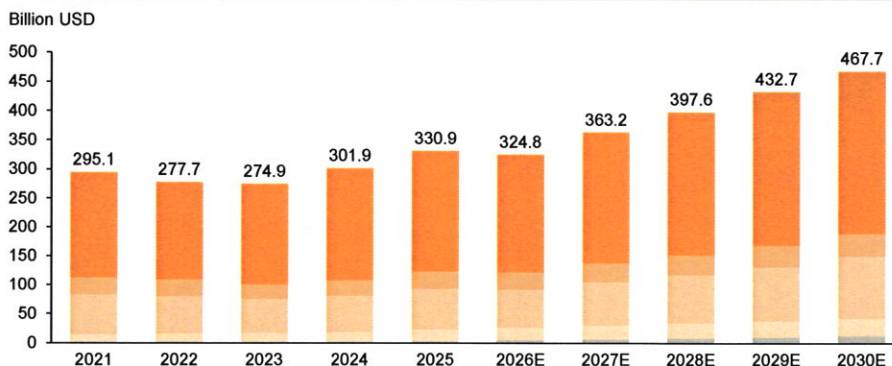
## Market Size of Global High-Precision Intelligent Manufacturing Platform Industry for Smart Electronics

Global smart electronics shipments reached 2,081.5 million units in 2024. Core application categories, such as smartphones, reached shipments of 1,238.8 million units in 2024. Looking ahead, driven by the integration of innovative products and the accelerated adoption of AI applications, global smart electronics shipments are projected to reach 2,619.3 million units by 2029, representing a CAGR of 4.9% from 2025. In 2029, smartphones are expected to retain the largest market share, with shipments projected to grow to 1,422.3 million units, achieving a CAGR of 3.3% starting from 2025. Meanwhile, the market for AI glasses and XR devices is expected to show rapid growth, collectively driving the fast penetration of global smart electronics.

# Overview of Global High-precision Intelligent Manufacturing Platform Industry For Core Electronic Devices

## Market Size of Global High-Precision Intelligent Manufacturing Platform Industry for Smart Electronics

Market Size of Global High-Precision Intelligent manufacturing Platform Industry for Smart Electronics, Classified by Product Types, 2021-2030E



	2021	2022	2023	2024	2025	2026E	2027E	2028E	2029E	2030E	CAGR 2021-2025	CAGR 2026E-2030E
Smartphones	182.9	169.8	175.3	194.9	208.3	203.7	226.7	246.2	264.9	280.2	3.3%	8.3%
of which, Foldable Devices	2.9	5.8	7.5	9.8	10.9	13.0	16.5	20.6	25.8	32.3	39.5%	25.7%
Tablets	29.3	28.4	24.6	26.6	30.5	29.5	32.1	34.7	36.8	38.4	1.0%	6.8%
Laptops	68.2	63.7	58.3	62.1	69.5	65.7	74.5	82.9	93.4	107.6	0.5%	13.1%
Smart Wearables	12.6	14.1	15.1	16.6	20.3	21.3	23.5	25.5	27.4	29.3	12.7%	8.3%
AI Glasses and XR Devices	2.1	1.7	1.6	1.7	2.3	4.6	6.4	8.3	10.2	12.2	3.3%	27.5%
<b>Total</b>	<b>295.1</b>	<b>277.7</b>	<b>274.9</b>	<b>301.9</b>	<b>330.9</b>	<b>324.8</b>	<b>363.2</b>	<b>397.6</b>	<b>432.7</b>	<b>467.7</b>	<b>2.9%</b>	<b>9.5%</b>

# Overview of Global High-precision Intelligent Manufacturing Platform Industry For Core Electronic Devices

## Market Size of Global High-Precision Intelligent Manufacturing Platform Industry for Smart Electronics

The continuous increase in AI computing power and the growing richness of applications is driving the demand for high-precision intelligent manufacturing for smart electronics, including AI smartphones, AI PCs, AI glasses and XR devices. Platform vendors, leveraging their experience and understanding of intelligent manufacturing, are forming capabilities to deliver vertically integrated all-in-one solutions. Core technologies are focusing on collaborative innovation in areas such as advanced thermal management and new material applications.

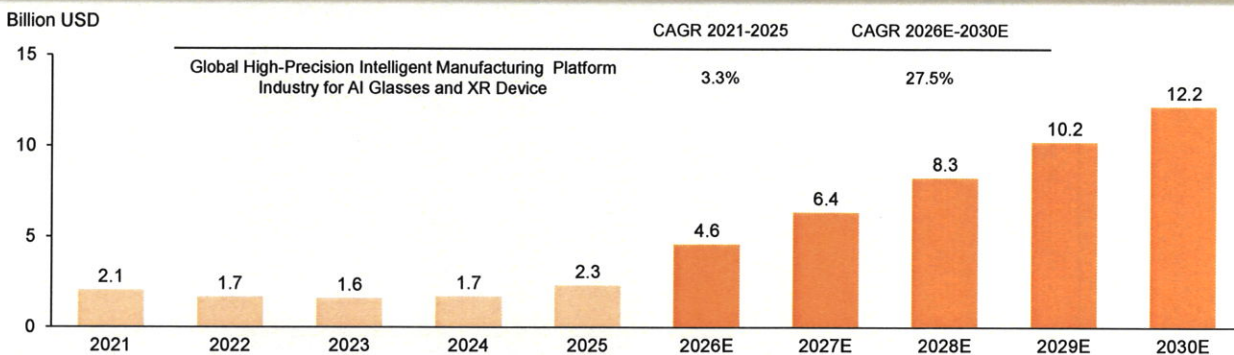
Smart electronics products are imposing increasingly high demands on hardware performance, lightweight or slim design, and multi-functional integration, directly spurring innovation in materials, manufacturing processes, and the functionality of structural components. The market size of the global smart electronics high-precision intelligent manufacturing platform industry grew from USD262.8 billion in 2020 to USD301.9 billion in 2024, achieving a CAGR of 3.5%. Smartphones accounted for over 60% of this market share. Looking ahead, the ongoing development of new hardware categories such as foldable devices, AI glasses and XR devices will further drive hardware toward lighter and slimmer form factors, higher performance, and improved thermal dissipation. The market size is projected to grow from USD325.9 billion in 2025 to USD441.3 billion in 2029, with a forecasted CAGR of 7.9% from 2025 to 2029.

The core high-precision hardware in foldable devices primarily includes components such as the foldable device support plate and the hinge module. The foldable device support plate is located between the flexible display and the hinge, providing the necessary structural support to ensure the screen remains flat and stable in both folded and unfolded states. The hinge module enables smooth and reliable folding and unfolding motions while maintaining long-term mechanical stability. From 2020 to 2024, the global market size for foldable device core high-precision hardware grew from USD0.8 billion to USD9.8 billion, achieving a CAGR of 88.8%. Looking ahead, the continuously-evolving performance requirements for support plates and hinge modules are expected to drive ongoing material innovation, advanced manufacturing processes, and overall market expansion. Supported by continuous product iterations and the accelerated popularization of foldable device models, the market is projected to grow from USD12.7 billion in 2025 to USD30.1 billion by 2029, with a CAGR of 24.2%.

# Overview of Global High-precision Intelligent Manufacturing Platform Industry For Core Electronic Devices

## Market Size of Global High-Precision Intelligent Manufacturing Platform Industry for Smart Electronics

Market Size of Global High-Precision Intelligent Manufacturing Platform Industry for AI Glasses and XR Devices, 2021-2030E

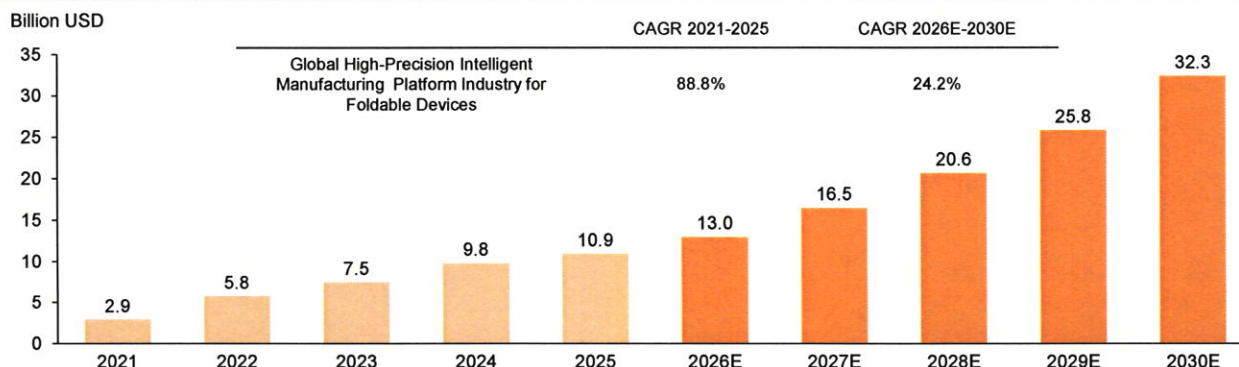


From 2020 to 2024, the global market size of the AI glasses and XR device high-precision intelligent manufacturing platform industry grew from USD1.3 billion to USD1.7 billion, demonstrating a CAGR of 8.2%. In the future, as the technological bottlenecks for AI glasses and XR device gradually overcome, market demand is set for a surge. Crucially, the high compatibility of AI glasses and XR device visual interaction advantages with AI large models makes them a core product form for AI implementation. It is projected that from 2025 to 2029, the market size will surge from USD2.5 billion to USD11.9 billion, achieving a CAGR of 48.0%.

## Overview of Global High-precision Intelligent Manufacturing Platform Industry For Core Electronic Devices

### Market Size of Global High-Precision Intelligent Manufacturing Platform Industry for Smart Electronics

Market Size of Global High-Precision Intelligent Manufacturing Platform Industry for Foldable Devices, 2021-2030E

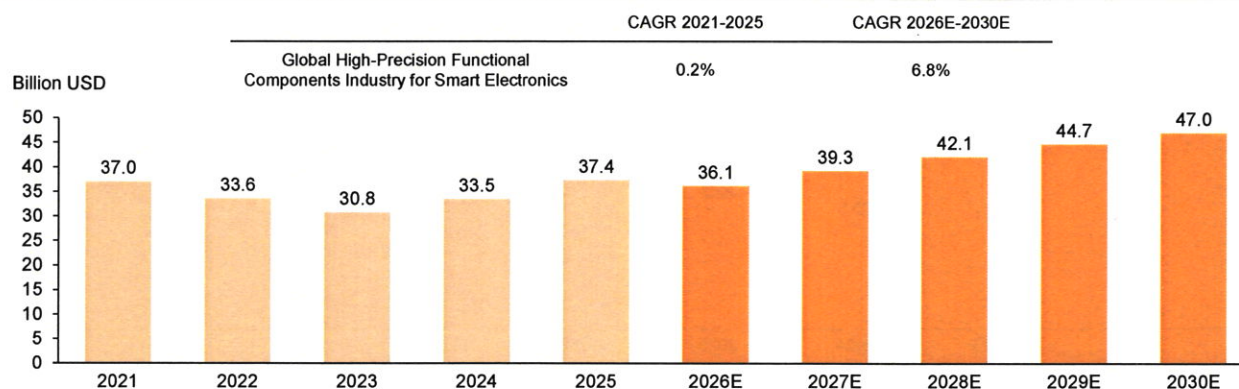


The core high-precision hardware in foldable devices primarily includes components such as the foldable device support plate and the hinge module. The foldable device support plate is located between the flexible display and the hinge, providing the necessary structural support to ensure the screen remains flat and stable in both folded and unfolded states. The hinge module, on the other hand, enables smooth and reliable folding and unfolding motions while maintaining long-term mechanical stability. From 2020 to 2024, the global market size for foldable device high-precision intelligent manufacturing platform grew from USD0.8 billion to USD9.8 billion, achieving a CAGR of 88.8%. Looking ahead, the continuously evolving performance requirements for support plates and hinge modules are expected to drive ongoing material innovation, advanced manufacturing processes, and overall market expansion. Supported by continuous product iterations and the accelerated popularization of foldable device models, the market is projected to grow from USD12.7 billion in 2025 to USD30.1 billion by 2029, with a CAGR of 24.2%.

## Overview of Global High-precision Intelligent Manufacturing Platform Industry For Core Electronic Devices

### Market Size of Global High-Precision Intelligent Manufacturing Platform Industry for Smart Electronics

Market Size of Global High-Precision Functional Components Industry for Smart Electronics, 2021-2030E

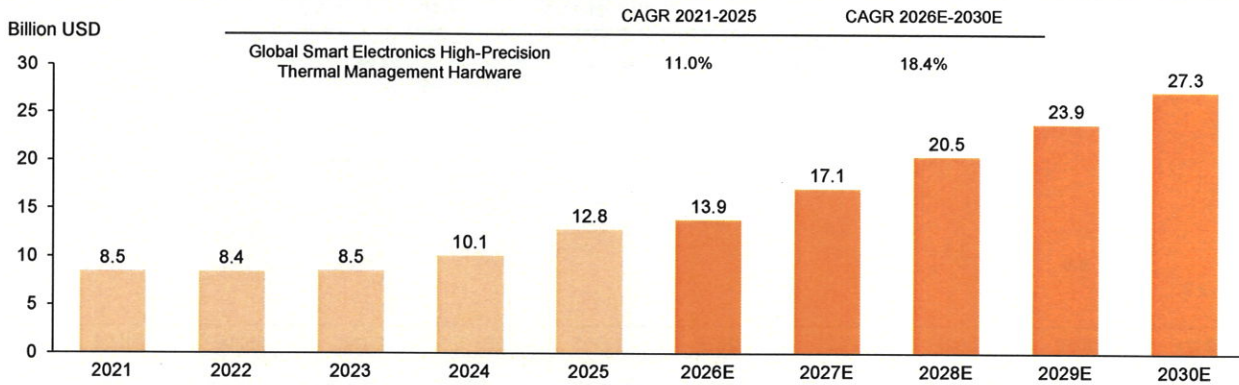


The high-precision functional components industry for smart electronics refers to the manufacturing of high-precision components that are embedded in smart electronic products to realize core functions such as bonding, cushioning, thermal management, sealing, electrical conduction, electromagnetic shielding, and insulation under complex operating conditions. The industry represents a fundamental and indispensable segment of the high-precision intelligent manufacturing platform industry for smart electronics, providing the critical hardware foundation. The market size of the global high-precision functional components industry for smart electronics grew from USD30.5 billion in 2020 to USD33.5 billion in 2024, representing a CAGR of 2.4%. Looking ahead, supported by further growth in smart electronics shipments, rising functional complexity, and increasing performance requirements, the market is expected to grow from USD35.5 billion in 2025 to USD44.5 billion in 2029, with a forecasted CAGR of 5.8% from 2025 to 2029.

## Overview of Global High-precision Intelligent Manufacturing Platform Industry For Core Electronic Devices

### Market Size of Global High-Precision Intelligent Manufacturing Platform Industry for Smart Electronics

Market Size of Global Smart Electronics High-Precision Thermal Management Hardware, 2021-2030E

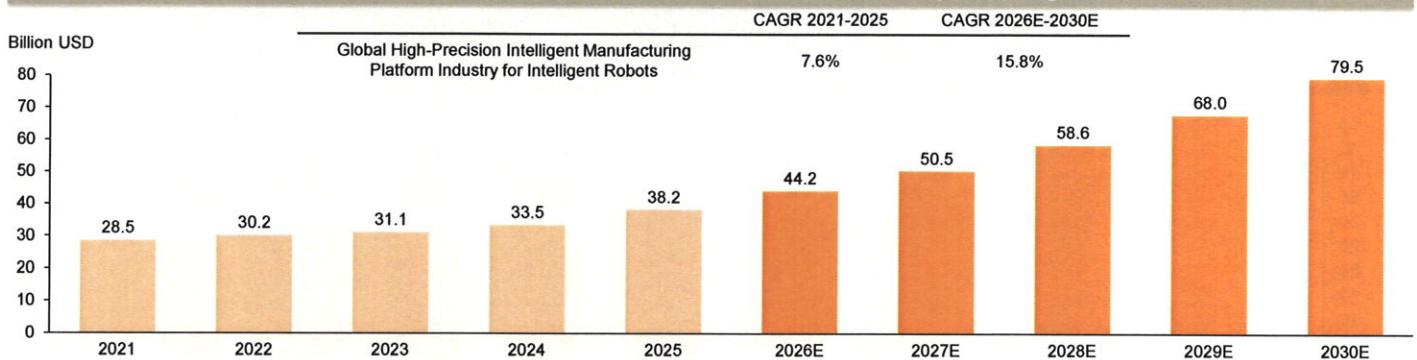


High-precision thermal management hardware mainly comprises cooling components and modules for smart electronics. From a material perspective, thermal management technologies in smart electronics primarily include vapor chamber (VC) technology and other graphite sheet-based solutions. VC technology is gradually becoming the mainstream cooling solution for smart electronics because it offers efficient and uniform heat dissipation while meeting the devices' demand for slim and light designs. The global market size for high-precision thermal management hardware for smart electronics grew from USD7.2 billion in 2020 to USD10.1 billion in 2024, representing a CAGR of 8.9%. Looking ahead, the market size is projected to increase from USD12.7 billion in 2025 to USD25.8 billion in 2029, with a high projected CAGR of 19.4%.

## Overview of Global High-precision Intelligent Manufacturing Platform Industry For Core Electronic Devices

### Market Size of Global High-Precision Intelligent Manufacturing Platform Industry for Intelligent Robots

Market Size of Global High-Precision Intelligent Manufacturing Platform Industry for Intelligent Robots, 2021-2030E

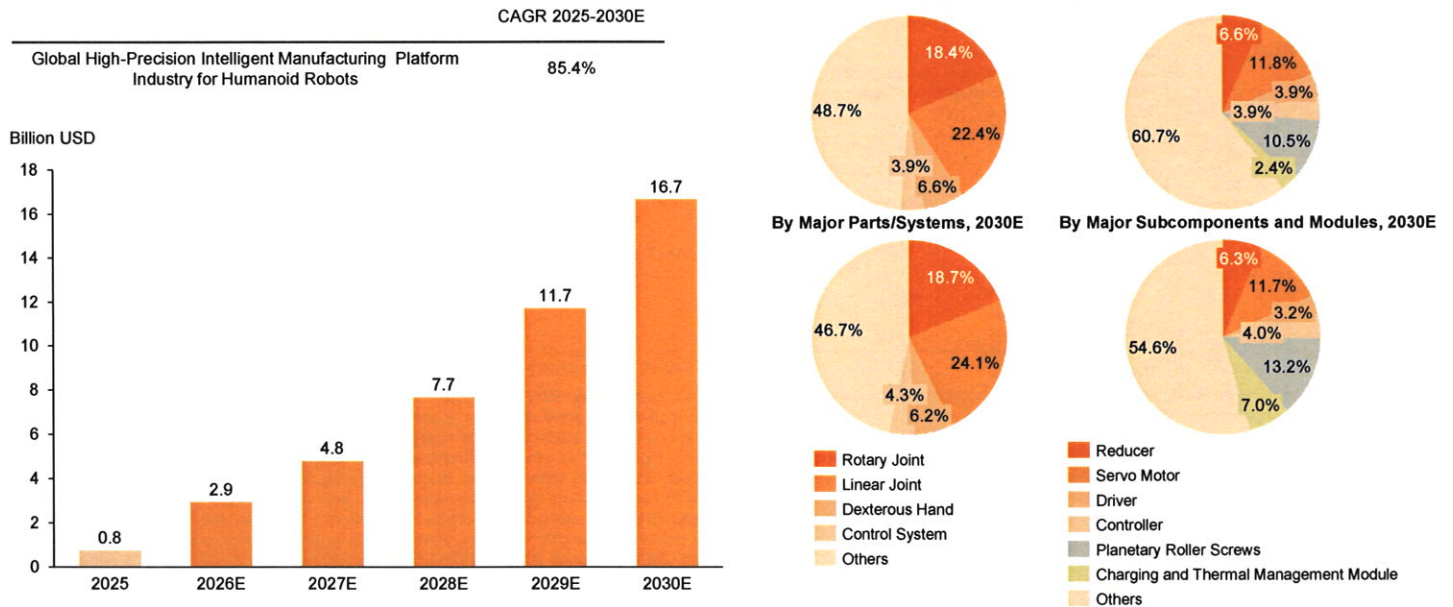


In recent years, the intelligent robot market has experienced rapid growth, driven by global manufacturing upgrades, labor structure changes, and breakthroughs in AI technologies. The market has expanded toward diversified directions, including service, industrial, and humanoid robots. Intelligent robots at the current stage demonstrate enhanced self-learning and collaborative capabilities across perception, decision-making, and execution layers, imposing higher demands on structural lightweighting, motion precision, and response speed. This trend drives technological evolution in core hardware, with components universally featuring high precision, high integration, and high stability, requiring exceptional manufacturing accuracy and consistency. Supported by hardware upgrades, process optimization, and continuous iteration of intelligent manufacturing systems, high-precision intelligent manufacturing platforms for intelligent robots are increasingly capable of meeting large-scale and high-precision production needs. These platforms drive continuous improvements in performance stability, assembly accuracy, and overall intelligence of robots. From 2020 to 2024, the market size of high-precision intelligent manufacturing platform industry for intelligent robots grew from USD24.7 billion to USD33.5 billion, with a CAGR of 7.9%. Looking ahead, with the rapid development of intelligent robots, the market is expected to further increase from USD38.1 billion in 2025 to USD67.3 billion in 2029, representing a CAGR of 15.3%.

# Overview of Global High-precision Intelligent Manufacturing Platform Industry For Core Electronic Devices

## Market Size of Global High-Precision Intelligent Manufacturing Platform Industry for Intelligent Robots

### Market Size of Global High-Precision Intelligent Manufacturing Platform Industry for Humanoid Robots, 2025-2030E



# Overview of Global High-precision Intelligent Manufacturing Platform Industry For Core Electronic Devices

## Market Size of Global High-Precision Intelligent Manufacturing Platform Industry for Intelligent Robots

With humanoid robots rapidly evolving from prototypes to commercial applications, the humanoid robot high-precision intelligent manufacturing platform market is emerging as a key growth area. In 2024, the market size of the global humanoid robot high-precision intelligent manufacturing platform industry reached approximately USD0.4 billion. Driven by breakthroughs in AI algorithms, continuous improvements in motion control systems, and expanding application scenarios across service, industrial, and consumer fields, the market size is expected to expand from USD0.4 billion in 2024 to USD11.5 billion in 2029, with a CAGR of 97.6%.

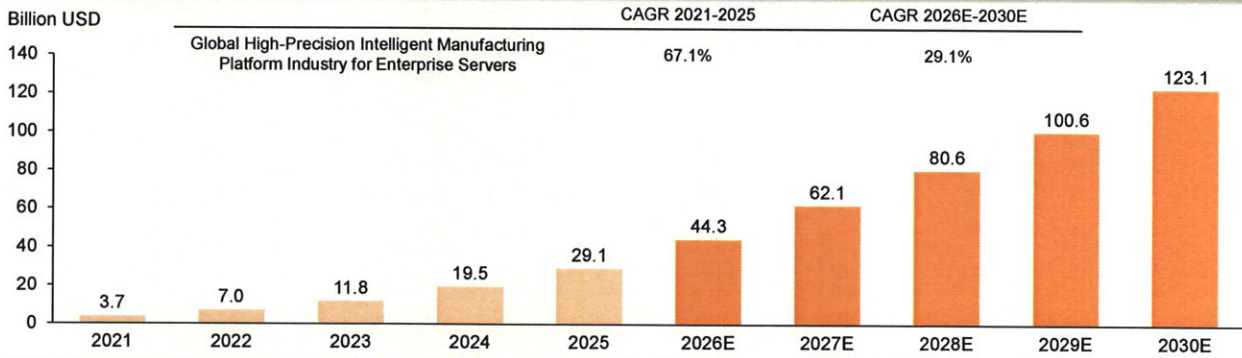
Within humanoid robots, rotary joints, linear joints, and dexterous hands are critical parts of the execution system, driving substantial demand for high-precision components and modules. As humanoid robots need to achieve balanced walking, precise manipulation, and human-machine interaction in complex environments, they place extremely high demands on component precision, consistency, and response speed. High-precision components can significantly reduce transmission errors, enhance control accuracy, and improve dynamic stability, thereby ensuring smooth, safe, and reliable motion. With the continuous increase in the degrees of freedom and structural flexibility of robots, system integration complexity is rising. In the future, dependence on high-precision components and functional modules will deepen further, while requirements for precision, power density, and modular design will continue to grow. The combined value contribution of rotary joints, linear joints, and dexterous hands is expected to increase from 47.4% in 2024 to 50.0% in 2029.

In terms of core subcomponents and modules, the high-precision hardware of humanoid robots mainly consists of reducers, servo motors, controllers, drivers, planetary roller screws, charging and thermal management modules. These core elements play a fundamental role in enabling motion control, power supply, and thermal management functions within humanoid robots. For example, reducers and servo motors determine the motion accuracy and stability of robots, controllers and drivers ensure coordinated and real-time responses, while charging and thermal management modules safeguard system energy efficiency and operational reliability. The combined market share of major subcomponents and modules is projected to increase from 36.2% in 2024 to 44.9% in 2029.

# Overview of Global High-precision Intelligent Manufacturing Platform Industry For Core Electronic Devices

## Market Size of Global High-Precision Intelligent Manufacturing Platform Industry for Enterprise Servers

Market Size of Global High-Precision Intelligent Manufacturing Platform Industry for Enterprise Servers, 2021-2030E

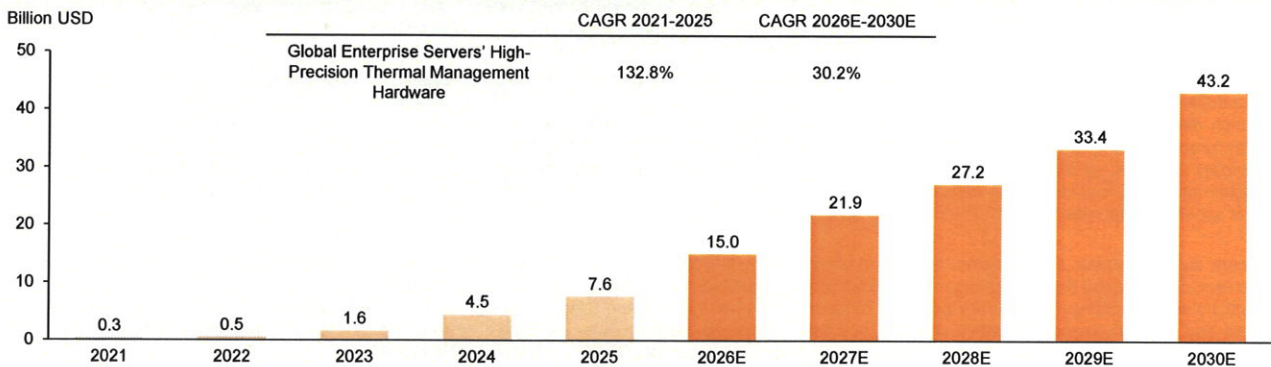


With the rapid growth in demand for large-scale AI model training and inference, global data centers are evolving towards higher power density and energy efficiency. Rack power density has increased from under 10kW to over 120kW, promoting liquid cooling modules and high-density power supplies as core R&D directions for the high-precision intelligent manufacturing platform serving enterprise servers. Liquid cooling modules, with their higher heat dissipation efficiency, lower energy consumption, and superior system stability, are rapidly replacing traditional air cooling, supporting high-computing-power chips operating stably in high heat flux density environments. Concurrently, power supply systems are also accelerating their upgrade towards high-voltage direct current (DC), high power density, and modularization to achieve higher energy efficiency and copper material utilization rates. Leading high-precision intelligent manufacturing platform companies are helping enterprise servers iterate towards higher performance and lower energy consumption by continuously improving the performance of thermal and power supply products. The global market for high-precision intelligent manufacturing platforms for enterprise servers covers core components and functional modules. In recent years, benefiting from growing computing power demand and accelerated deployment of ultra-large-scale, high-power computer rooms by global AI giants and large cloud service providers, this market expanded rapidly, growing from USD2.3 billion in 2020 to USD19.5 billion in 2024, with a CAGR of 71.4% during this period. Looking forward, as demand for high-performance AI computing infrastructure continues to grow, the market is expected to accelerate further, with the market size projected to reach USD92.3 billion by 2029, representing a CAGR of 36.2% from 2025.

# Overview of Global High-precision Intelligent Manufacturing Platform Industry For Core Electronic Devices

## Market Size of Global High-Precision Intelligent Manufacturing Platform Industry for Enterprise Servers

Market Size of Global Enterprise Servers' High-Precision Thermal Management Hardware, 2021-2030E

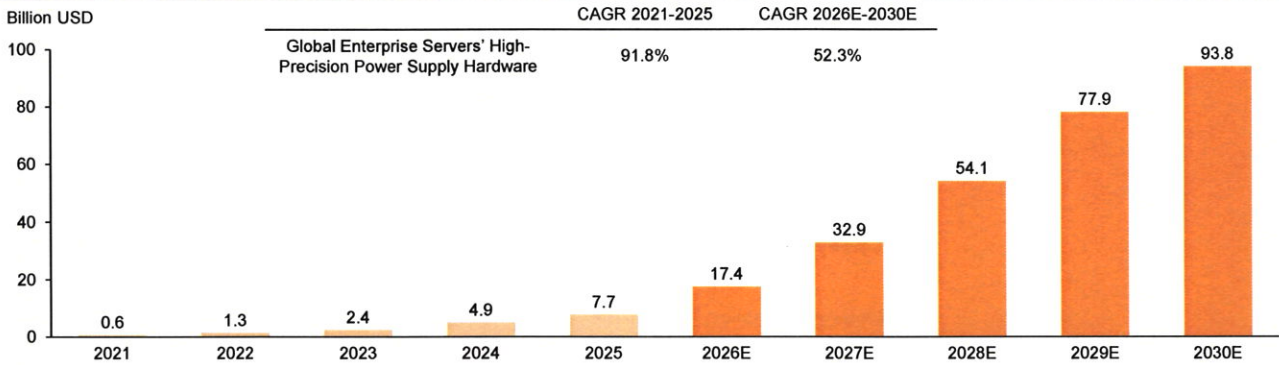


With the surge in AI computing power, the heat dissipation requirements of servers have increased significantly, driving exponential growth in the market for high-precision thermal management hardware for enterprise servers. The global market size grew from USD0.2 billion in 2020 to USD4.5 billion in 2024, with a CAGR of 133.6% during this period. Looking forward, the market is projected to maintain strong growth momentum, reaching USD33.0 billion by 2029, with a CAGR of 47.1% from 2025. Against the backdrop of continuously increasing data center power density and energy efficiency requirements, traditional air-cooling methods can no longer adequately support the thermal management needs of enterprise servers, and liquid cooling solutions are rapidly gaining penetration. Concurrently, rising data center energy consumption and tightening green policies are pushing data centers to accelerate their transition towards greener operations. Taking China as an example, the "Data Center Green and Low-Carbon Development Special Action Plan" issued in 2024 proposed that the national average Power Usage Effectiveness (PUE) of data centers must be reduced to below 1.5 by the end of 2025. The accelerated adoption of liquid cooling technology will further drive demand growth for high-precision thermal management hardware, consolidating its strategic position as a core support for sustainable AI infrastructure expansion.

# Overview of High-precision Intelligent Manufacturing Platform Industry For Core Electronic Devices

## Market Size of Global Enterprise Servers' High-Precision Power Supply Hardware

Market Size of Global Enterprise Servers' High-Precision Power Supply Hardware, 2021-2030E



The market size of global high-precision power supply hardware for enterprise servers has also expanded rapidly, increasing from USD0.3 billion in 2020 to USD4.9 billion in 2024, with a CAGR of 94.8%. This growth is driven by the surging demand for AIDC, which requires more advanced power supply hardware to support the stable operation of high-power computing loads. As AIDC develops towards larger scale and higher power density, power supply systems are being correspondingly optimized to improve wiring and copper material utilization efficiency, thereby reducing infrastructure construction costs and transmission losses. This places higher standards on power supply systems in terms of efficient conversion, compact layout, and thermal optimization. Compared to traditional power supplies, power supplies for enterprise servers carry greater power per unit volume and ensure stable operation of equipment in high-load environments through advanced thermal design, effectively supporting high-power computing. Looking forward, the market size of global high-precision power supply hardware for enterprise servers is projected to reach USD21.8 billion in 2029, with a CAGR of 32.4% from 2025.

# Overview of High-precision Intelligent Manufacturing Platform Industry For Core Electronic Devices

## Competitive Landscape of Global High-Precision Intelligent Manufacturing Platform Industry for Smart Electronics

Ranking of Global High-precision Intelligent Manufacturing Platform Industry for Smart Electronics by Revenue, 2025

Ranking	Company Name	Revenue (Billion USD)	Market Share
1	Company A	10.0	3.0%
2	Company B	5.5	1.7%
3	the Company	5.1	1.6%
4	Company C	3.0	0.9%
5	Company D	2.0	0.6%
Subtotal			7.7%

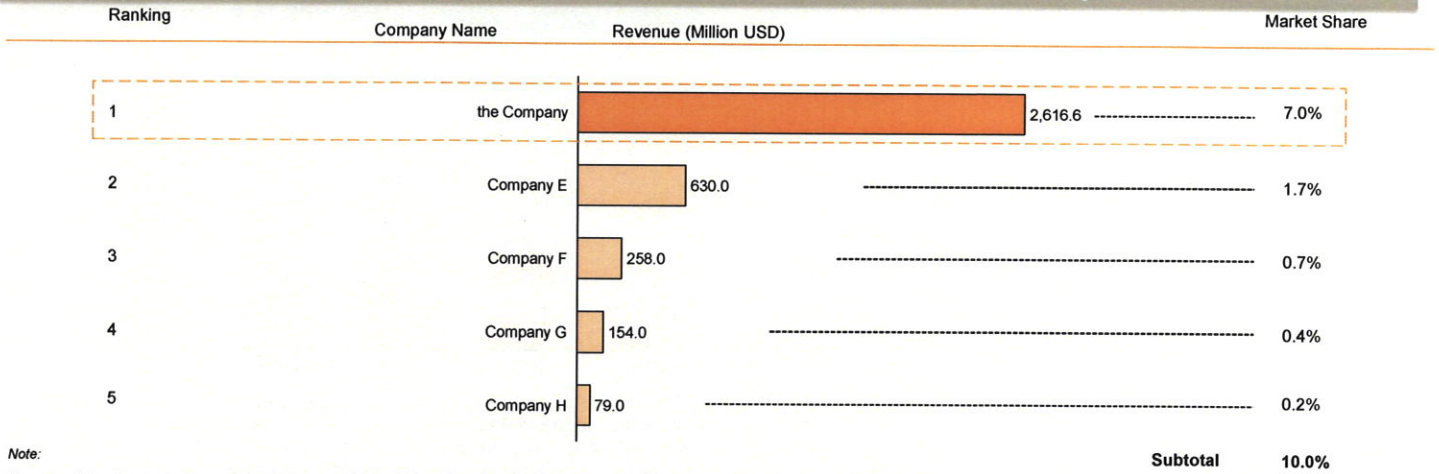
**Note**

Company A is a listed company on the Shenzhen Stock Exchange established in 2004, with a business focus on precision intelligent manufacturing, from components and modules to systems.  
 Company B is a listed company on the Shenzhen and Hong Kong Stock Exchange established in 2003, mainly specializes in the design and manufacturing of high-precision structural components and modules, especially for consumer electronics.  
 Company C is a non-listed company established in 1986, providing structural and modular solutions for intelligent devices, focusing on the intelligent manufacturing of precision structural components for consumer electronics.  
 Company D is a listed company on the Shenzhen Stock Exchange established in 2001, mainly engaged in the production of precision structural components, modules, and complete devices, with leading manufacturing and integration capabilities in the fields of consumer electronics, new energy, and intelligent equipment.

# Overview of High-precision Intelligent Manufacturing Platform Industry For Core Electronic Devices

## Competitive Landscape of Global High-Precision Functional Component Industry for Smart Electronics

Ranking of Global High-precision Functional Component Industry for Smart Electronics by Revenue, 2025



Note:

Company E is a listed company on the Shenzhen Stock Exchange established in 1993, focusing on the manufacturing of high-precision functional components, electromagnetic shielding materials, and thermal conductive materials, which are widely applied in the consumer electronics and communications sectors.

Company F is a listed company on the Shenzhen Stock Exchange established in 1999, mainly providing precision functional components, precision structural components, and modules for consumer electronics.

Company G is a listed company on the Shenzhen Stock Exchange established in 2016, with main products including precision functional components and intelligent automation equipment, serving applications in consumer electronics, automotive, and new energy industries.

Company H is a listed company on the Shenzhen Stock Exchange established in 2004, primarily engaged in the production, and sales of functional and structural components for consumer electronics, as well as optical and wearable modules.

24



Source: Annual Reports of Listed Companies, Interviews with industry experts by Frost & Sullivan, Frost & Sullivan

## Agenda

- 1 Overview of Global High-precision Intelligent Manufacturing Platform Industry for Core Electronic Devices
- 2 Overview of Global High-precision Intelligent Manufacturing Platform Industry for Intelligent Vehicles And Advanced Air Mobility
- 3 Raw Material Price Analysis
- 4 Appendix



# Overview of Global High-precision Intelligent Manufacturing Platform Industry for Intelligent Vehicles and Advanced Air Mobility

## Definition of High-Precision Intelligent Manufacturing Platform Industry for Intelligent Vehicles and Advanced Air Mobility

In recent years, the intelligent vehicle industry has experienced rapid growth, driven by rising global demand and continuous policy support for environmental sustainability and intelligent transportation systems. Advancements in electrification and autonomous driving technologies have further accelerated the penetration of intelligent vehicles across markets. Looking ahead, the trend of "Intelligent Transformation of Both ICE Vehicles and Electric Vehicles" ("油电双智") is expected to become a key direction for the industry, catering to diverse consumer preferences and fostering large-scale global adoption and growth. The global sales volume of smart vehicles is expected to increase from 73.2 million units in 2025 to 92.1 million units in 2029, with a CAGR of 5.9%.

At the same time, advanced air mobility is emerging as a vibrant new sector, encompassing a range of commercial activities within low-altitude airspace (typically below 1,000 meters above sea level). Its rapid rise is underpinned by favorable government policies, continuous technological progress, and expanding market demand. In the future, advanced air mobility is expected to evolve into a critical component of new infrastructure, transforming urban transportation, logistics, emergency response, and other application scenarios, while unlocking new opportunities for industrial and regional development.

The high-precision intelligent manufacturing platform industry for intelligent vehicles and advanced air mobility refers to an integrated manufacturing system that applies advanced precision processing, automated production, and intelligent technologies to deliver core components, functional modules, and other high-precision hardware for intelligent vehicles and advanced air mobility applications—such as smart electronics. This platform encompasses key domains such as power systems, chassis systems, and body systems, enabling the intelligent, electrified, and connected evolution of both industries while enhancing product safety, reliability, and overall user experience.

# Overview of Global High-precision Intelligent Manufacturing Platform Industry for Intelligent Vehicles and Advanced Air Mobility

## Market Drivers and Developing Trends Analysis of Global High-Precision Intelligent Manufacturing Platform Industry for Intelligent Vehicles and Advanced Air Mobility

### Technology-Driven Evolution

- The rapid advancement of vehicle intelligence, electrification, and advanced air mobility is driving continuous innovation in automotive and aerospace manufacturing platforms. Rising complexity in powertrains, sensor modules, electronic control units (ECUs), connectivity systems, and propulsion units demands higher precision, integration, thermal management, and modularization, while miniaturization and reliability requirements spur innovation in materials, processes, and digitalized workflows. This convergence fosters platform-based, scalable, and intelligent manufacturing ecosystems that enable rapid customization, vertical integration, and long-term competitive advantages.

### Strengthened Battery Safety Standards Accelerate Upgrades

- Strengthened regulatory oversight on battery safety, thermal management, and crash protection is emerging as a major driver of structural innovation in intelligent manufacturing platforms serving both intelligent vehicles and advanced air mobility hardware. In China, the Ministry of Industry and Information Technology (MIIT) has led the development of a mandatory national standard, "Safety Requirements for Traction Battery of Electric Vehicles" (《電動汽車用動力蓄電池安全要求》), effective on July 1, 2026. This regulation introduces higher thresholds for battery safety, thermal runaway prevention, and structural integrity, setting a technical benchmark for the entire power battery industry.

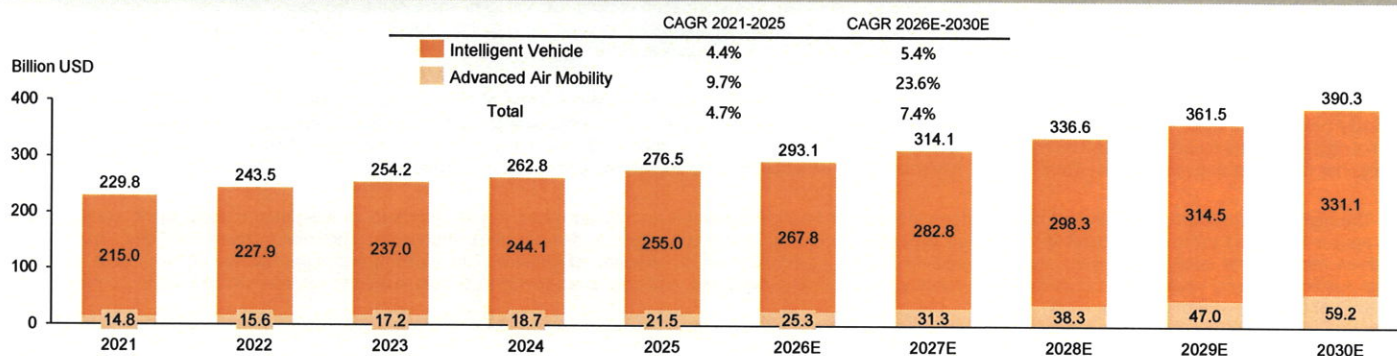
### Accelerating Advanced Air Mobility Innovation Through Policy and Precision Manufacturing

- Government initiatives such as relaxed airspace regulations, subsidies for innovation, and clearer regulatory frameworks are accelerating demand, providing manufacturers with stable order pipelines and expansion opportunities. To remain competitive, manufacturers must enhance precision in producing critical components, such as structural components and core modules, while meeting increasingly stringent requirements for safety, performance, and cost efficiency.

## Overview of Global High-precision Intelligent Manufacturing Platform Industry for Intelligent Vehicles and Advanced Air Mobility

### Market Size of Global High-Precision Intelligent Manufacturing Platform Industry for Intelligent Vehicles and Advanced Air Mobility

Market Size of Global High-Precision Intelligent Manufacturing Platform Industry for Intelligent Vehicles and Advanced Air Mobility, 2021-2030E



In recent years, driven by the rapid expansion of the intelligent vehicles and advanced air mobility industries, the global market size of high-precision intelligent manufacturing platforms for intelligent vehicles and the advanced air mobility has grown from USD214.5 billion in 2020 to USD262.8 billion in 2024, representing a CAGR of 5.2% during the period. Among these, the intelligent vehicle segment expanded from USD204.7 billion in 2020 to USD244.1 billion in 2024. Meanwhile, the advanced air mobility segment increased from USD9.8 billion in 2020 to USD18.7 billion in 2024, driven by advances in electrification, intelligent technologies, autonomous systems, and the growing demand for emerging advanced air mobility applications. Looking ahead, the industry's market size is projected to further expand to USD357.0 billion by 2029, with a CAGR of 6.6% starting from 2025. The intelligent vehicle segment is expected to remain the primary contributor, while the advanced air mobility, supported by ongoing technological innovation and favorable policy measures, is poised to become a key growth engine, creating substantial business opportunities across the entire industry value chain.

## Overview of High-precision Intelligent Manufacturing Platform Industry for Intelligent Vehicles and Advanced Air Mobility

### Competitive Landscape of Global High-Precision Intelligent Manufacturing Platform Industry for Intelligent Vehicles and Advanced Air Mobility

The competitive landscape of the high-precision intelligent manufacturing platform industry for intelligent vehicles and advanced air mobility is highly fragmented and rapidly evolving. Market participants are diverse, including traditional automotive component suppliers, emerging high-tech startups, specialized high-precision hardware manufacturers, and vertically integrated OEMs. Each type of player possesses distinct advantages in areas such as high-precision manufacturing processes, automated production capabilities, lightweight material applications, and AI-driven manufacturing solutions, collectively forming a dynamic and highly competitive industrial ecosystem. Against this backdrop, companies in the industry must continuously innovate, enhance production efficiency, and build intelligent manufacturing platforms with flexibility and scalability to maintain competitiveness amid rapid technological iteration and intensifying market competition.

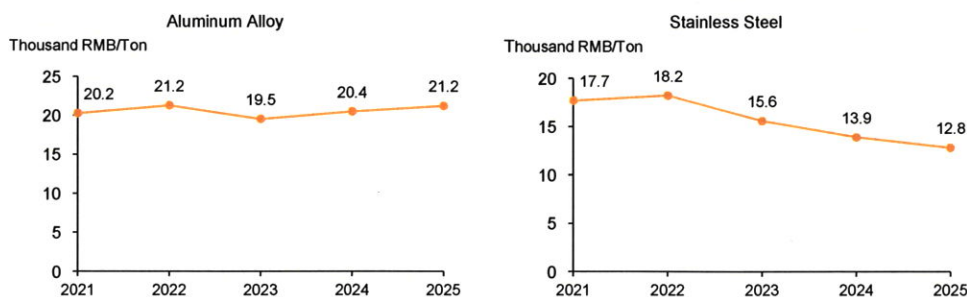
## Agenda

- 1 Overview of Global High-precision Intelligent Manufacturing Platform Industry for Core Electronic Devices
- 2 Overview of Global High-precision Intelligent Manufacturing Platform Industry for Intelligent Vehicles And Advanced Air Mobility
- 3 **Raw Material Price Analysis**
- 4 Appendix



## Raw Material Price Analysis

Prices of Aluminum Alloy, Stainless Steel and Ceramic Powder in China, 2021-2025



The production of high-precision hardware relies on key raw materials such as aluminum alloys, stainless steel and cermet powder.

For aluminum alloys, increasing demand for lightweight applications has driven prices from RMB20.2 thousand per ton in 2021 to RMB21.2 thousand per ton in 2025. Prices of aluminum alloys are expected to remain on an upward trajectory, underpinned by sustained demand and potential supply constraints.

Stainless steel is widely adopted in high-precision hardware for its durability and ability to ensure structural integrity. Driven by raw material shortages and soaring energy costs, stainless steel prices reached a historic high of RMB18.2 thousand per ton in 2022. Subsequently, as supply constraints eased and the global economy entered a period of slower growth, stainless steel prices gradually normalized, falling to around RMB12.8 thousand per ton in 2025. Looking ahead, prices are expected to remain relatively stable, supported by steady demand for high-grade stainless steel from the high-precision hardware industry.

Source: Wind, BAIINFO, Interviews with industry experts by Frost & Sullivan, Frost & Sullivan

## Agenda

- 1 Overview of Global High-precision Intelligent Manufacturing Platform Industry for Core Electronic Devices
- 2 Overview of Global High-precision Intelligent Manufacturing Platform Industry for Intelligent Vehicles And Advanced Air Mobility
- 3 Raw Material Price Analysis
- 4 **Appendix**



## Supporting Statement

- Nine out of every ten AI glasses and XR devices sold globally, in terms of sales volume in 2025, came from LINGYI ITECH's customers.
- LINGYI ITECH's humanoid robot customers and partners include several players among the top five manufacturers by shipments in 2025.
- LINGYI ITECH is among the high-precision intelligent manufacturing platforms for electronic devices with the broadest product portfolio worldwide.
- As of December 31, 2025, LINGYI ITECH's customers encompassed major global AI glasses and XR device manufacturers, collectively driving the evolution of AI-powered visual hardware.
- As of December 31, 2025, LINGYI ITECH's customers included five of the top seven foldable device manufacturers in terms of shipments in 2025.
- LINGYI ITECH is among the high-precision intelligent manufacturing platforms for electronic devices with the widest global footprint.
- Overlapping Customers and Suppliers are common in the high-precision intelligent manufacturing platform industry for core electronic devices due to the need for deep technical collaboration and supply chain security considerations.
- The smart electronics market is highly concentrated, particularly among top-tier brands that command a large share of global shipments.
- LINGYI ITECH's mobile phone die-cutting business ranked No. 1 in the world in the industry by revenue in 2012.
- LINGYI ITECH is among the earliest high-precision intelligent manufacturing platform globally to develop robotics and automation hardware, with continuous progress since 2006.
- LINGYI ITECH is among the first to achieve mass production of ultra-thin titanium-alloy supports and carbon-fiber support plates, meeting the industry's demand for lighter yet stronger form factors.
- LINGYI ITECH develop one of the world's first stainless-steel VC for smart electronics.
- Domestic shipments of smartphones, the largest downstream product in the consumer electronics sector, experienced a slight decrease of approximately 0.6% in 2025.

## Research Methodologies

- Frost & Sullivan is an independent global consulting firm, which was founded in 1961 in New York. It offers industry research and market strategies and provides growth consulting and corporate training. Its industry coverage includes automotive and transportation, chemicals, materials and food, commercial aviation, consumer products, energy and power systems, environment and building technologies, healthcare, industrial automation and electronics, industrial and machinery, and technology, media and telecom.
- The Frost & Sullivan's report includes information on global high-precision intelligent manufacturing platform industry.
- Frost & Sullivan has conducted detailed primary research which involved discussing the status of the industry with certain leading industry participants and conducting interviews with relevant parties. Frost & Sullivan has also conducted secondary research which involved reviewing company reports, independent research reports and data based on its own research database. Frost & Sullivan has obtained the figures for the estimated total market size from historical data analysis plotted against macroeconomic data as well as considered the above-mentioned industry key drivers.
- Frost & Sullivan's Market Engineering Forecasting Methodology integrates several forecasting techniques with the Market Engineering Measurement-based System. It relies on the expertise of the analyst team in integrating the critical market elements investigated during the research phase of the project. These elements include:
  - ✓ Expert-opinion forecasting methodology
  - ✓ Integration of market drivers and restraints
  - ✓ Integration with the market challenges
  - ✓ Integration of the Market Engineering Measurement trends
  - ✓ Integration of econometric variables
- In compiling and preparing the Report, Frost & Sullivan has adopted the following assumptions:
  - ✓ The social, economic and political environment of the world and China is likely to remain stable in the forecast period
  - ✓ Related industry key drivers are likely to drive the market in the forecast period