灼识咨询
China Insights Consultancy

Industry Report on Global Specialized PCB Equipment Industry

January 2026

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2026.01.29

CIC introduction, methodologies and assumptions

China Insights Consultancy is commissioned to conduct research and analysis of, and to produce a report on specialized PCB equipment industry. The report commissioned has been prepared by China Insights Consultancy independent of the influence of the Company or any other interested party.

China Insights Consultancy is an investment consulting company originally established in Hong Kong. Its services include industry consulting services, commercial due diligence, strategic consulting, and so on. Its consultant team has been tracking the latest market trends in the automobile, agriculture, chemical, user goods, marketing and advertising, culture and entertainment, energy and industry, finance and service, healthcare, TMT, transportation, and other industries, and has the most relevant and insightful market intelligence in these mentioned industries.

China Insights Consultancy undertook both primary and secondary research using various resources to construct this report. Primary research involved interviewing key industry experts and leading industry participants. Secondary research involved analyzing data from various publicly available data sources, including National Bureau of Statistics, Prismark, industry associations, etc. The information and data collected by China Insights Consultancy have been analyzed, assessed, and validated using China Insights Consultancy's in-house analysis models and techniques. The methodology used by China Insights Consultancy is based on information gathered from multiple levels, which allows for such information to be cross-referenced for reliability and accuracy.

The CIC Report was compiled based on the following assumptions: (i) economy development in global is likely to maintain a steady growth trend in the next decade; (ii) related industry key drivers are likely to drive the continuing growth of the specialized PCB equipment industry, such as the favorable policies, advancement on related technology and (iii) there will be no extreme force majeure or unforeseen industry regulations in which the market may be affected in either a dramatic or fundamental way during the forecast period.

All statistics are reliable and based on the most recent information available as of the date of this report. Other sources of information, including governments, industry associations, or marketplace participants, may have provided some of the information on which data or its analysis is based.

All the information about the Company is provided by the Company and sourced from either the Company's own audited report or management interviews. China Insights Consultancy is not responsible for verifying the information obtained from the Company.

Terms and Abbreviations (1/3)

Terms

- **Attachment Equipment:** The attachment equipment refers to a typr of process automation solutions，used to apply a uniform layer of dry film photoresist onto the surface of copper-clad laminate before photolithography or bonding stiffeners、polymide onto flexible board to enhance mechanical strength..
- **Automated Optical Inspection**: It is an advanced technology that employs optical imaging systems, computer algorithms, and automated control mechanisms to perform non-contact, high-precision quality control in production processes.
- **Automated Visual Inspection Equipment**: It refers to advanced systems that utilize computer vision, high-resolution imaging, and AI-driven algorithms to perform non-contact, real-time quality control in industrial manufacturing. These systems replace or supplement manual inspections by detecting defects, verifying assembly accuracy, and ensuring compliance with predefined standards across diverse industries.
- **Brown Oxide Line:** A chemical pre-treatment process applied to inner layers of multilayer PCBs to enhance surface roughness, promoting stronger interlayer bonding during lamination.
- **Control Circuits:** Integrated electrical circuits used to regulate and manage the functioning of PCB production equipment, often embedded into automation systems.
- **Curing Oven Line:** A heating system used in PCB manufacturing to solidify or cure solder masks, adhesives, or ink layers.
- **Developing-Etching-Stripping Equipment**：It mainly refers to an integrated production line system combining three critical processes in microfabrication and PCB production, including developing, etching, and stripping. These steps are essential for pattern transfer and material modification in industries such as semiconductor, display, and flexible electronics.
- **Drill Bit Grinder Equipment**: A tool for sharpening and reshaping drill bits used in mechanical drilling machines to maintain accuracy and efficiency.
- **Dry Film Laminator:** Equipment that applies a dry film photoresist to the PCB surface prior to UV exposure in photolithography, critical for pattern formation.
- **Drilling Machine**: The drilling equipment utilizes the advanced laser ablation and mechanical drilling technologies to fabricate through-holes, blind vias, and microvias, addressing critical interconnect challenges of PCB production.
- **Electrical Test Equipment:** Systems that assess electrical properties, such as conductivity and continuity, in PCBs to ensure functionality and detect open or short circuits.

Terms and Abbreviations (2/3)

Terms

- **Eletroplating Machine:** The electroplating equipment refers to specialized machinery and systems designed to deposit metallic layers onto PCB through electrochemical processes. This equipment ensures conductive pathways, interlayer connectivity, and surface protection by precisely controlling the thickness, uniformity, and adhesion of metal coatings.
- **Etching-Stripping Line:** A set of chemical processing machines used to remove unwanted copper and resist materials from dePCBs, refining circuit patterns.
- Formation Machine: The formation equipment defines the final outline and mechanical features of PCB through precision cutting, contour milling, and stress-relief processes. This step ensures dimensional accuracy and compatibility with downstream assembly operations
- **Lamination Equipment:** The lamination process in PCB production involves bonding multiple double-sided boards or HDI core layers with prepreg (pre-impregnated material) and copper foil to form a multilayered PCB structure. This process ensure mechanical integrity and electrical consistency.
- **Laser Drilling Machine**: It is an advanced manufacturing tool that utilizes focused laser beams to create precise holes in materials, ranging from micrometers to millimeters in diameter. Unlike traditional mechanical drilling, it employs non-contact ablation to remove material, enabling ultra-high precision and versatility across industries such as PCB fabrication, aerospace, semiconductors, and ceramics
- **Legend Inkjet Printer:** It is a specialized industrial-grade character jetting system designed for high-precision marking, coding, or decorating applications on substrates such as PCB boards, ceramics, plastics, and metals. It employs inkjet technology to deliver ultra-fine droplets of UV-curable or solvent-based ink, enabling permanent, high-resolution markings with exceptional accuracy and speed.
- **Mechanical Drilling Machine:** A device that drills precise holes in PCBs using mechanical rotating tools such as carbide bits.
- **Mechanical Formation Machine:** Equipment that performs precision mechanical cutting, trimming, or shaping to finalize PCB edges or profiles.
- **PCB: Printed Circuit Board.** A fundamental component of modern electronic devices, used to mechanically support and electrically connect electronic components using conductive pathways.
- **Photolithography Equipment:** The photolithography systems mainly encompass LDI systems that define circuit patterns on photoresist-coated copper layers, addressing high resolution and alignment accuracy challenges of PCB production.

Terms and Abbreviations (3/3)

Terms:

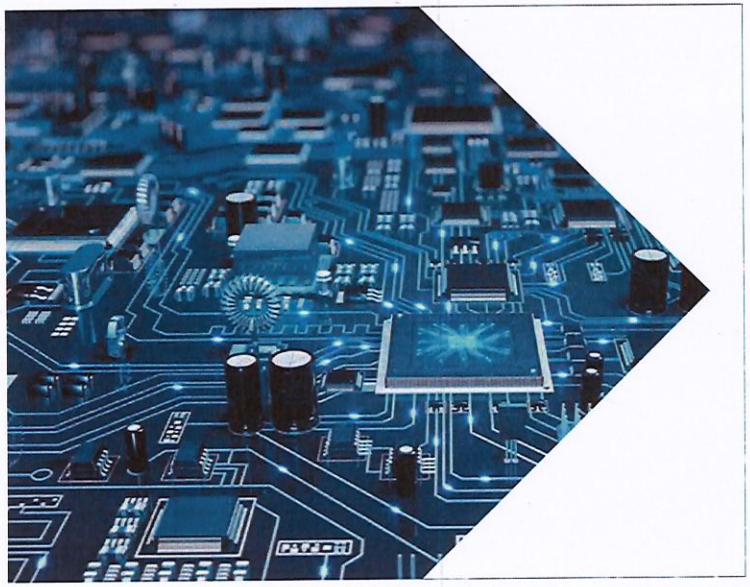
- **Plated Through Hole Deposition Line:** A series of machines used to deposit conductive material into PTHs, ensuring interlayer electrical connectivity.
- **Specialized PCB Equipment:** Specialized PCB equipment encompassed advanced production machinery engineered to produce PCB through a full-process workflow, spanning from substrate material processing to the final formation of finished circuit boards.
- **Stripping-Etching-Tin Stripping Line:** A chemical processing line used to remove residual photoresist, etch exposed copper, and strip tin coating in PCB production.
- **VCUT Beveling Machine:** Equipment used to cut V-grooves or chamfer edges in PCBs, often for panel separation or assembly alignment.
- **X-Ray Drilling Target Alignment System:** A high-precision system that uses X-rays to align drilling locations with internal circuit layers, ensuring accuracy in multilayer PCBs.

Terms and Abbreviations (2/2)

Abbreviations:

- **AI:** Artificial Intelligence
- **AOI:** Automated Optical Inspection
- **ASIC:** Application-specific Integrated Circuit
- **AVI:** Automated Visual Inspection
- **CAGR:** Compound Annual Growth Rate
- **DES:** Developing-Etching-Stripping
- **FPC:** Flexible Printed Circuit
- **GPU:** Graphics Processing Unit
- **HDI:** High-Density Interconnect
- **LDI:** Laser Direct Imaging
- **mm**: Milimeter
- **PCB:** Printed Circuit Board
- **PTH:** Plated Through Hole
- **Prepreg:** Pre-impregnated Material
- **R&D:** Research and development
- **VCP:** Vertical Continuous Plating

Content



The Specialized PCB Equipment Industry Embraces a New Era of Intelligent Production

Analysis

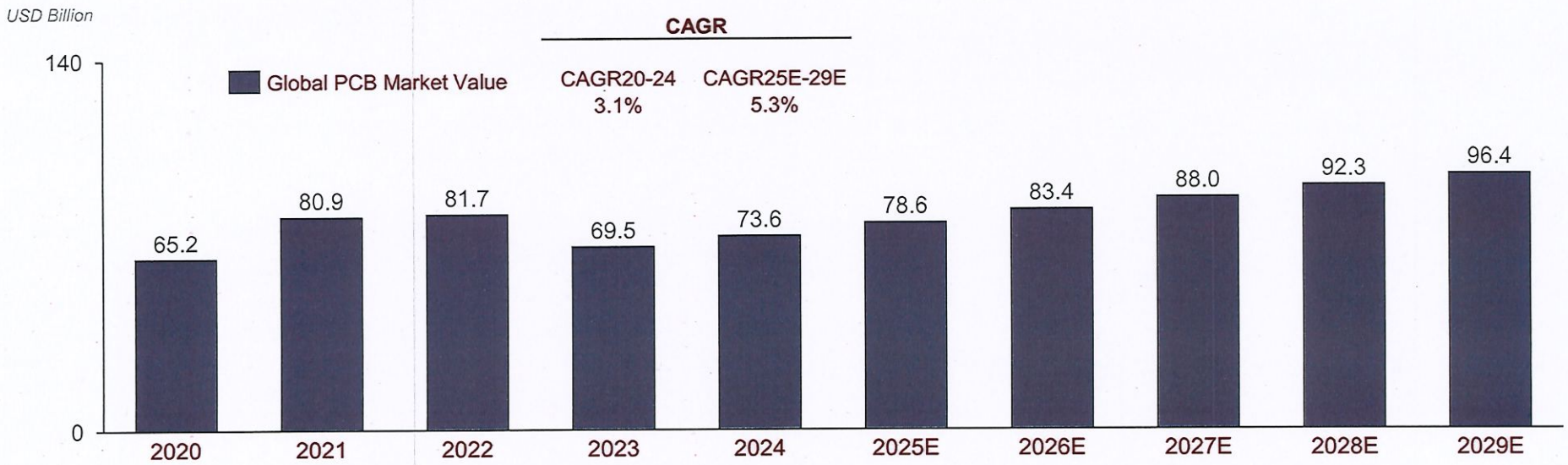
- Driven by the rapid development of the infrastructure of AI industrial chain, the global electronics terminal industry has experienced sustained robust revenue growth from 2023 to 2024, with servers and data storage devices emerging as the most dynamic segments. As the PCB is the foundational enablers of modern electronics, surging demand for electronic terminal devices, combined with continuous functional advancements, has propelled significant growth in PCB products, while catalyzing a profound transformation within the specialized PCB equipment industry.

- In particular, the increasing demand for high-value PCB products, brought the innovation of AI-related applications, is driving significant advancements in the precision, efficiency, and intelligence of specialized PCB production equipment. This trend is further stimulating technological innovation throughout the specialized PCB equipment industry. In response to the continuous improvement of AI infrastructure and related industrial chain, the specialized PCB equipment industry is expected to make continuous advancements in intelligent production, precision engineering, and high-efficiency production, providing strong momentum for the industry's growth and innovation.

Source: CIC

Global PCB Industry Output Value

Global PCB Market Value, 2020-2029E



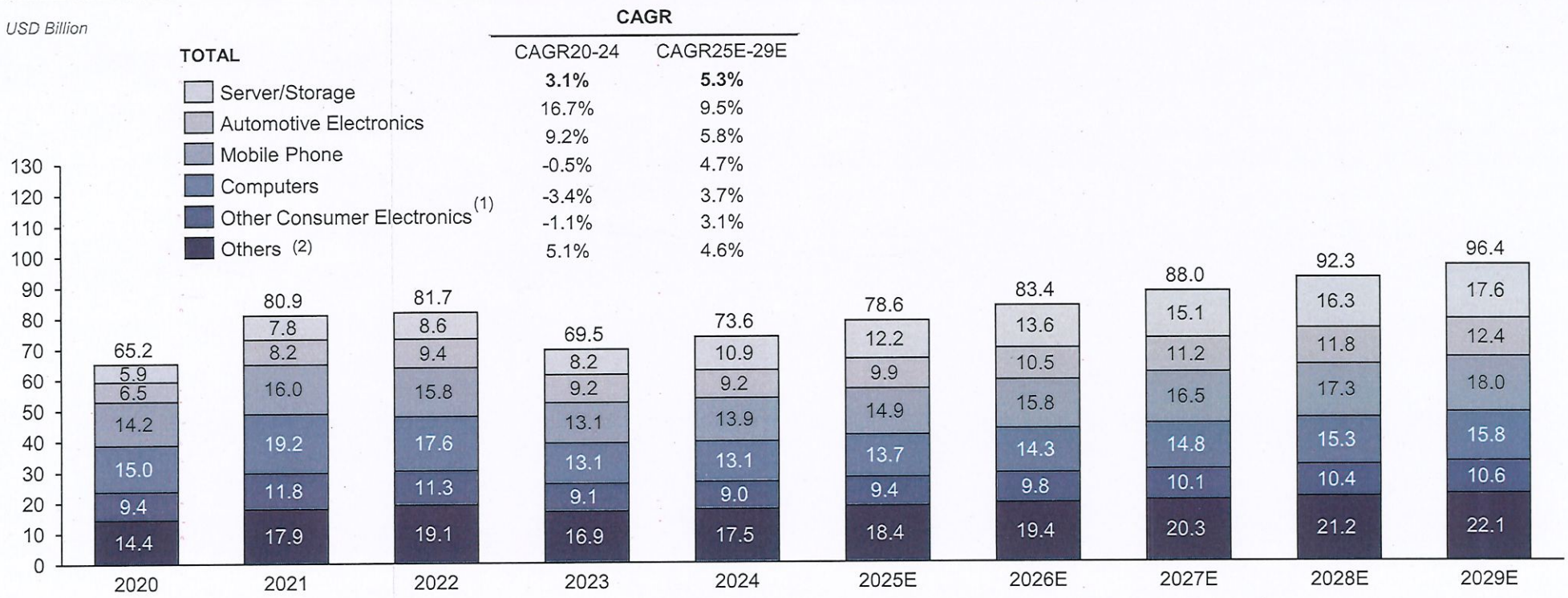
Analysis

- With the continued acceleration of the AI technologies and automotive intelligence, the global PCB industry is experienced a stable increase in market demand in 2024. The global PCB industry output value, which refers to the total market value of PCB products, increased from US$65.2 billion in 2020 to US$ 73.6billion in 2024, with a CAGR of 3.1% from 2020 to 2024. The global PCB industry output value is expected to reach to US$ 96.4billion in 2029, representing a CAGR of 5.3% from 2025 to 2029.

Source: CIC

Global PCB Industry Output Value

Global PCB Market Value, by Major Application, 2020-2029E



Note:

(1) Consumer electronics refer to mass-produced electronic devices designed for personal, household, or recreational use. These products are intended to enhance convenience, entertainment, communication, and daily living. Other consumer electronics mainly refer to audio-visual equipment, home appliances, wearables and etc.,.

(2) Others including wired and wireless communication infrastructure, industrial products, medical and aerospace.

Source: CIC

Global PCB Industry Output Value

Analysis of Global PCB Market Value, by Major Application, 2020-2029E

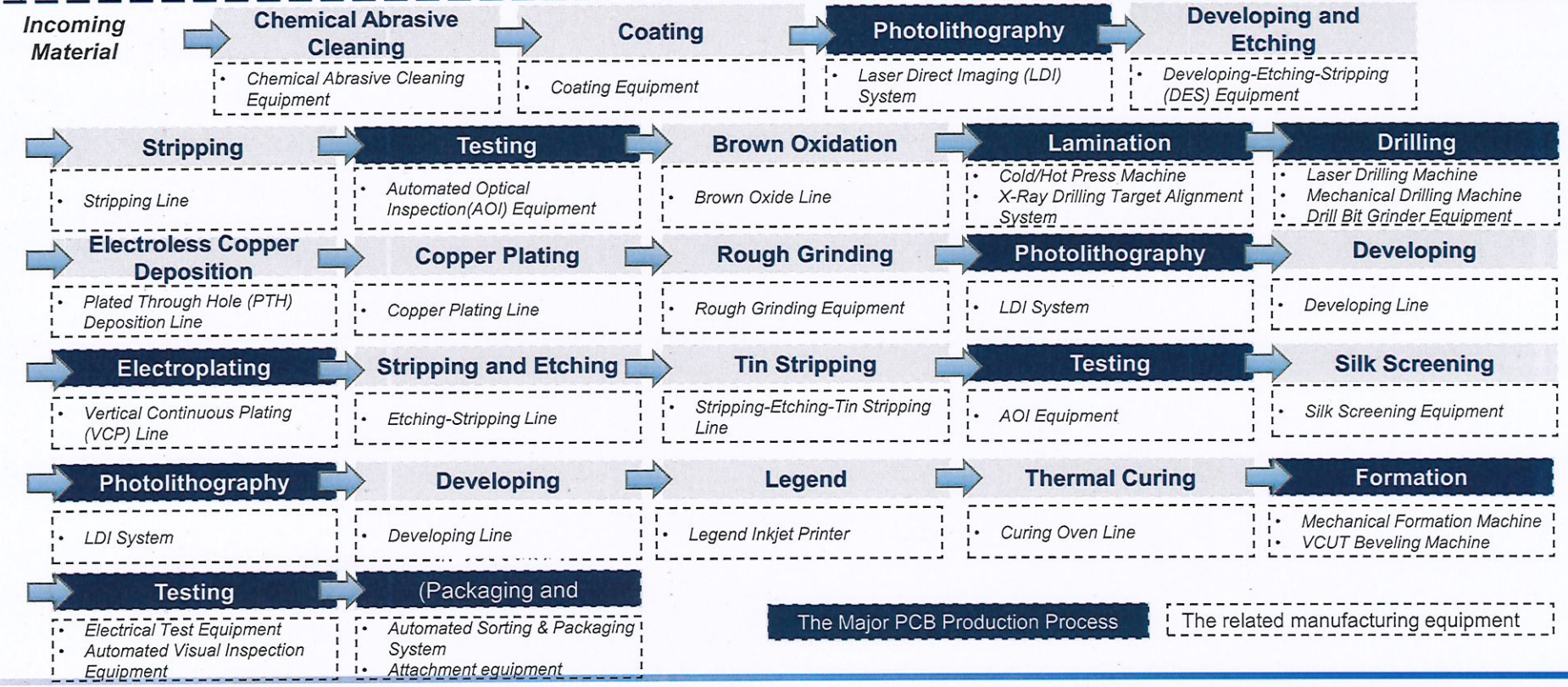
Analysis

- The demand for PCBs has been increasing alongside the rapid advancement of technology and the proliferation of electronic products in China and globally. The fast growth of end-use applications is directly driving the upgrade and replacement of production equipment. Scenarios such as the increasing electrification of smart vehicles, surging demand for high-performance servers, and the functional upgrade of consumer electronics are placing higher demands on PCBs in terms of reliability, miniaturization, and integration. Traditional specialized PCB equipment can no longer meet the requirements of these advanced processes, compelling enterprises to adopt more advanced, high-performance specialized PCB equipment. Furthermore, leading global PCB manufacturers are accelerating capacity expansion, further fueling demand for specialized PCB production equipment. The global PCB output value declined by 15% in 2023 compared to 2022, primarily due to a contraction in demand from the consumer electronics sector, which is a major end-use application for PCB products. For instance, PCB output value for mobile phones decreased from US$15.8 billion in 2022 to US$13.1 billion in 2023, representing a decrease of 17.1%, while the global PCB output value of computer decreased from US$17.6 billion in 2022 to US$13.1 billion in 2023.
- In the consumer electronics segment, following a peak in global product shipments in 2021–2022, the market gradually entered a correction phase. Downstream brand owners slowed new orders to digest channel inventory, coupled with weakening demand for key end products such as smartphones and PCs, resulting in a decline in overall shipments and, in turn, a decrease in related PCB output value. In the automotive electronics segment, in 2023, subdued macroeconomic conditions, misaligned vehicle production and sales schedules, and structural shortages of automotive-grade chips led to production volumes falling short of expectations, which constrained the release of PCB demand in vehicles. In addition, excess inventory built up by automakers in 2022 transitioned into destocking pressure in 2023.

Introduction of the major PCB production processes and required equipment

Introduction of the major PCB production processes and required equipment

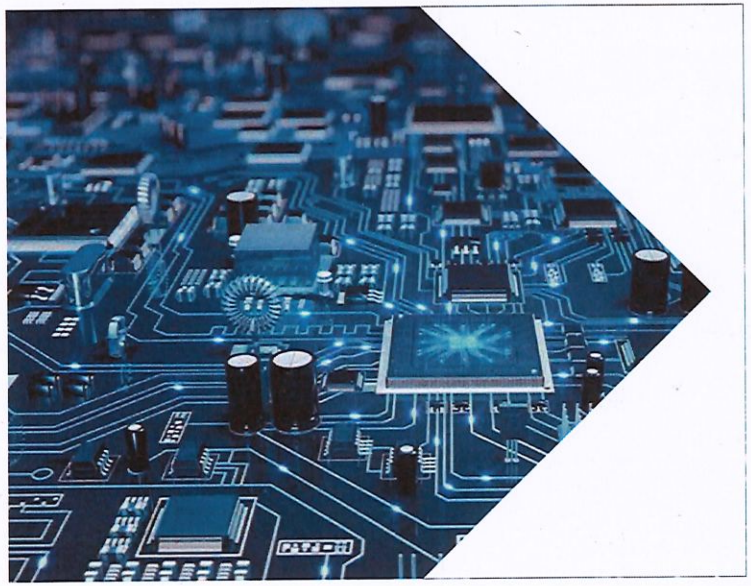
- While there are process variations among different PCB products, the major PCB production processes encompass drilling, photolithography, lamination, formation and testing. Each of these processes leverages major specialized PCB equipment, which ensure the precision, performance, and reliability of the PCB products and require substantial capital investment in a PCB production line. The following chart sets forth key products of the Group and the role they play along the major PCB production processes



Note：(1) The above processes take the production of multi-layer PCB as an example.

Source: CIC

Content



Definition and Classification of Specialized PCB Equipment Industry

Analysis

- Compared to the manufacturing processes of other electronic components, PCB production is distinguished by its multi-stage production processes, stringent precision tolerances, and adaptability to diverse substrate materials. These characteristics necessitate a highly specialized production workflow that demands production machinery engineered explicitly for PCB production. Consequently, the production equipment utilized in PCB production process is specifically designed in accordance with the technical requirements of PCB production, and is not applicable to the production of other electronic components. The production equipment involved in the PCB production process is referred to as specialized PCB production equipment, which denotes advanced machinery that is purpose-built and custom-designed based on the specific requirements of PCB production flow, spanning from substrate material processing to the final formation of finished circuit boards. The term of "Specialized PCB Equipment" is widely accepted in the industry. For example, relevant industry associations and organizers of electronics trade exhibitions have also adopted this term in their published materials. Specialized PCB production equipment leverages precision processing and inspection technologies to meet the high precision, operational stability, and production efficiency across various PCB products and application scenarios.

- While there are process variations among different PCB products, the major PCB production processes encompass photolithography, lamination, drilling, electroplating, formation, testing and attachment. Each of these processes leverages major specialized PCB production equipment, which ensure the precision, performance, and reliability of the PCB products and require substantial capital investment in a PCB production line.

Source: CIC

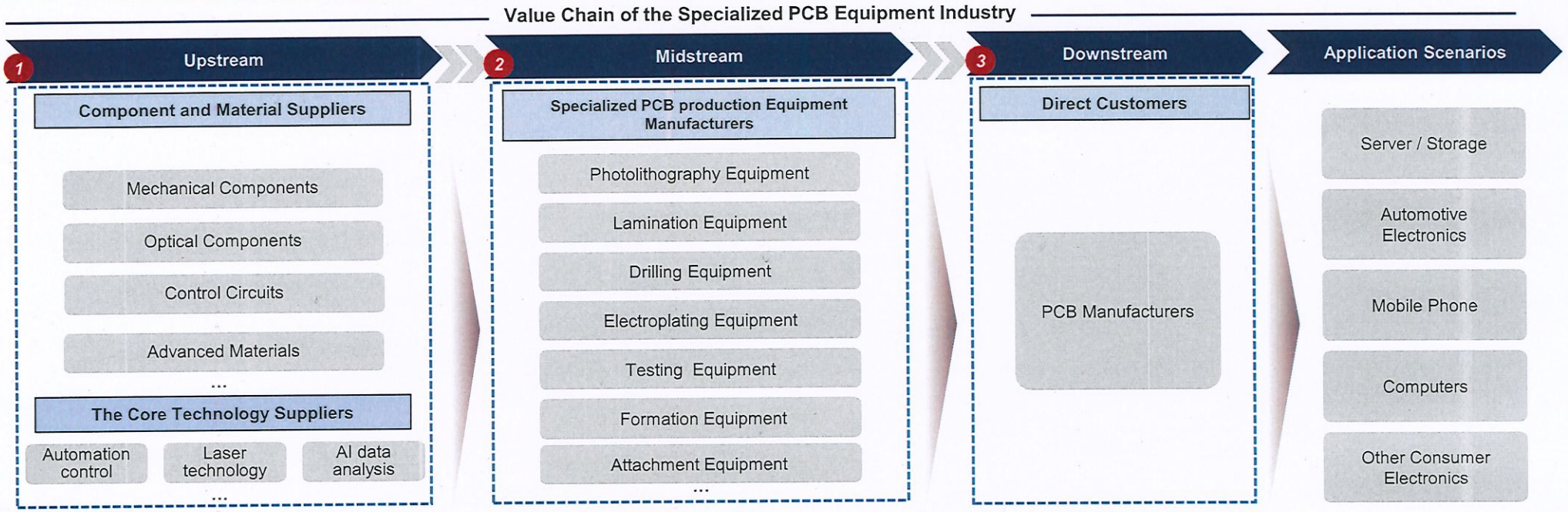
Definition and Introduction of Specialized PCB Equipment

Category	Description
Photolithography Equipment 	■ The photolithography systems mainly encompass LDI systems that define circuit patterns on photoresist-coated copper layers, addressing high resolution and alignment accuracy challenges of PCB production.
Lamination Equipment 	■ The lamination process in PCB production involves bonding multiple double-sided boards or HDI core layers with prepreg (pre-impregnated material) and copper foil to form a multilayered PCB structure. This process ensure mechanical integrity and electrical consistency.
Drilling Equipment 	■ The drilling equipment utilizes the advanced laser ablation and mechanical drilling technologies to fabricate through-holes, blind vias, and microvias, addressing critical interconnect challenges of PCB production.
Electroplating Equipment 	■ The electroplating equipment refers to specialized machinery and systems designed to deposit metallic layers onto PCB through electrochemical processes. This equipment ensures conductive pathways, interlayer connectivity, and surface protection by precisely controlling the thickness, uniformity, and adhesion of metal coatings.
Testing Equipment 	■ The testing equipment covers utilizes different inspection systems to verify layer alignment, connectivity, and defect-free circuitry of PCB production.
Formation Equipment 	■ The formation equipment defines the final outline and mechanical features of PCB through precision cutting, contour milling, and stress-relief processes. This step ensures dimensional accuracy and compatibility with downstream assembly operations.
Attachment Equipment 	■ The attachment equipment refers to specialized process automation systems designed to apply precise, uniform layers of dry film photoresist onto copper-clad laminate surfaces before photolithography, or to bond stiffeners and polyimide films onto flexible printed circuit boards. These systems play a critical role in electronic manufacturing by ensuring consistent material deposition.

- **Specialized PCB equipment encompassed advanced production machinery engineered to produce PCB through a full-process workflow, spanning from substrate material processing to the final formation of finished circuit boards. Specialized PCB equipment leverages precision processing and inspection technologies to meet the high precision, operational stability, and production efficiency across various PCB products and application scenarios**

Source: CIC

Value Chain of the Specialized PCB Equipment Industry



Analysis

- The specialized PCB equipment industry chain mainly includes: 1)Upstream suppliers of the component and material of specialized PCB equipment, as well as core technology. The component and material of specialized PCB equipment mainly comprises mechanical components, optical components, control circuits, and advanced materials. The suppliers of core technology provides automation control, laser technology, and AI data analysis to specialized PCB equipment production; 2)Midstream consists of the specialized PCB production equipment manufacturers responsible for the R&D, production and sales of specialized PCB equipment; 3)Downstream participants of the industry primarily comprises PCB manufacturers, which is considered as the direct customer of the specialized PCB production equipment manufacturers and provide multiple types of PCB products to various application scenarios, such as server and storage, automotive electronics, mobile phone, computers, consumer electronics and others. Given the high technology barrier for PCB production, leading specialized PCB production equipment manufacturers are adopting vertical integration strategies to enhance their technological ecosystems. It has become an industry standard practice for specialized PCB production equipment manufacturers to procure core components from upstream suppliers, who also simultaneously purchase PCB production equipment from these manufacturers.

Source: CIC

Major Policies in Specialized PCB Equipment Industry

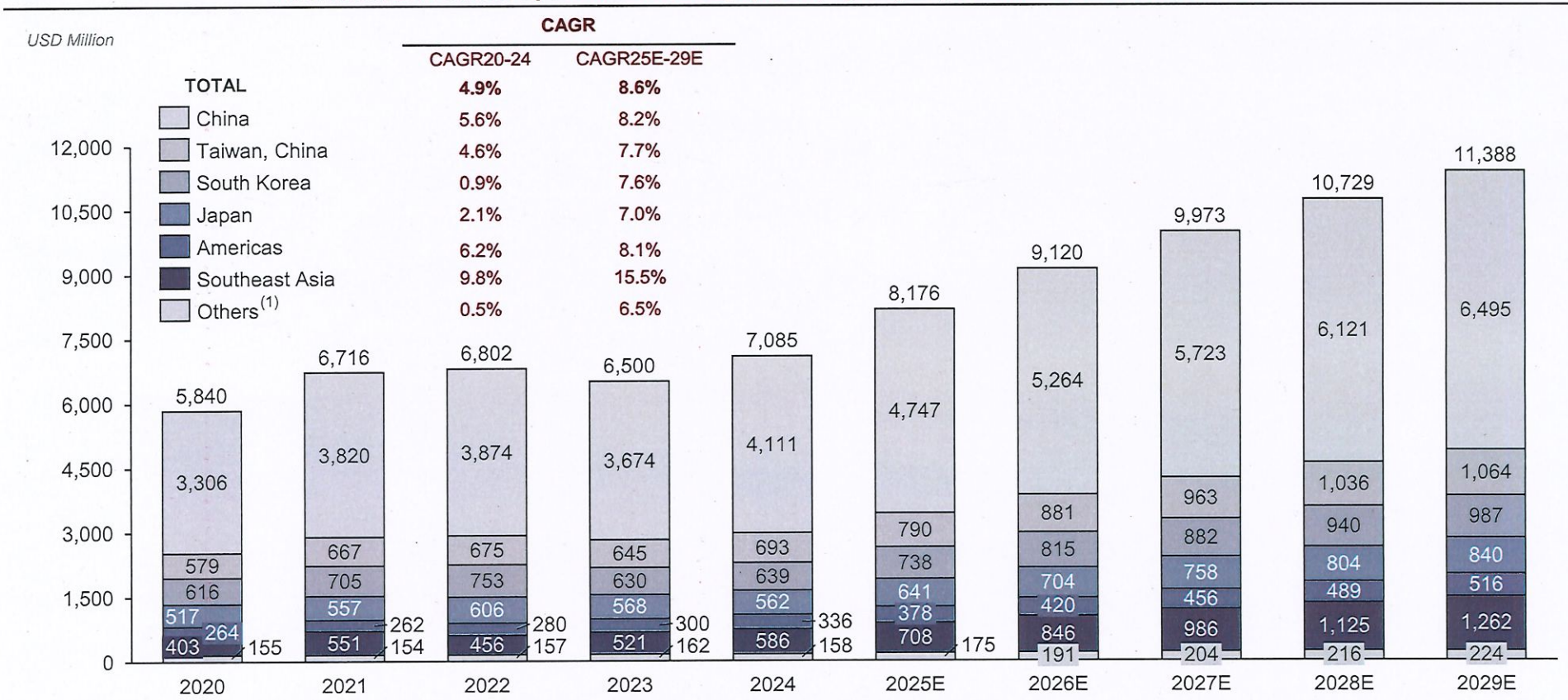
Policies and Regulations for China's specialized PCB manufacturing equipment industry			
Policy / Regulation	**Authority**	**Issuing Date**	**Policy Content**
Guidelines for Equipment Upgrades and Technological Transformation in Key Industrial Sectors	Ministry of Industry and Information Technology	May 2024	• Focus on the automation, intelligence, flexibility, and energy-saving transformation of production and testing equipment for electronic components and electronic materials. Accelerate the miniaturization, chip integration, high-frequency, high-precision, and high-reliability development of electronic components. Prioritize upgrades in segmented areas such as circuit components, connectors, electromechanical components, sensor components, optical communication devices, and key electronic materials. By 2027, the sector-wide equipment upgrade is expected to meet domestic demands for high-performance, high-efficiency, intelligent, and green production and testing equipment, with industry-leading enterprises in certain segments reaching world-class equipment standards.
Industrial Structure Adjustment Guidance Catalogue (2024 Edition)	National Development and Reform Commission	December 2023	• Accelerate the digital empowerment of life services by developing new consumption scenarios such as smart commercial districts, smart streets, and smart stores. Foster new models like "Internet+" healthcare services and digital education. Expedite the deployment of emerging formats such as unmanned retail stores, self-pickup lockers, and cloud-based lockers. Support the growth of industries such as e-sports, social e-commerce, and livestream e-commerce.
Action Plan for Stabilizing Growth of the Electronic Information Manufacturing Industry (2023–2024)	Ministry of Industry and Information Technology, Ministry of Finance	August 2024	• Enhance the level of innovation-driven development. Focus on key application areas such as personal computing, new display technologies, VR/AR, 5G communication, and intelligent connected vehicles, and promote technological breakthroughs in electronic materials, specialized electronic equipment, and electronic measurement instruments.
Opinions on Deepening the Reform of the Administrative System in the Electronics and Electrical Appliance Industry	General Office of the State Council	September 2022	• Increase support for R&D and innovation in the foundational electronics industry. Coordinate relevant policy resources to intensify support for the upgrading and key technological breakthroughs of the foundational electronics industry—including electronic materials, electronic components, specialized electronic equipment, and electronic measurement instrument manufacturing.
Outline of the 14th Five-Year Plan for National Economic and Social Development of the People's Republic of China and the Long-Range Objectives Through the Year 2035	National People's Congress	March 2021	• Deepen the implementation of intelligent manufacturing and green manufacturing initiatives, develop new models of service-oriented manufacturing, and promote the high-end, intelligent, and green transformation of the manufacturing industry. Cultivate clusters of advanced manufacturing and promote innovation-driven development in sectors such as integrated circuits, aerospace, marine engineering equipment, robotics, advanced rail transit equipment, advanced power equipment, construction machinery, high-end CNC machine tools, pharmaceuticals, and medical devices. Furthermore, the plan explicitly calls for promoting the development of key strategic emerging industries such as electronic information, high-end equipment, new energy vehicles, and aerospace, which further unleashes downstream demand for high-end PCB products. This is expected to drive the expansion and upgrading of the specialized PCB equipment market. Additionally, the plan emphasizes the construction of smart factories and digital workshops, encouraging the introduction of automated and intelligent equipment in key manufacturing processes. This is likely to generate increased demand for high-end specialized PCB equipment during the digital and intelligent transformation of PCB manufacturers.

- **National ministries and commissions have successively released a series of policies aimed at strengthening the development of electronic manufacturing and high-end industrial equipment, providing strong policy momentum and a favorable growth environment for the specialized PCB manufacturing equipment industry.**

Source: CIC

Market Size of Global Specialized PCB Equipment

Market Size of Global Specialized PCB Equipment, by Region, in Terms of Revenue, 2020-2029E



Note:
(1) Others mainly refer to Southeast Asia and other emerging markets

Source: Prismark, CIC

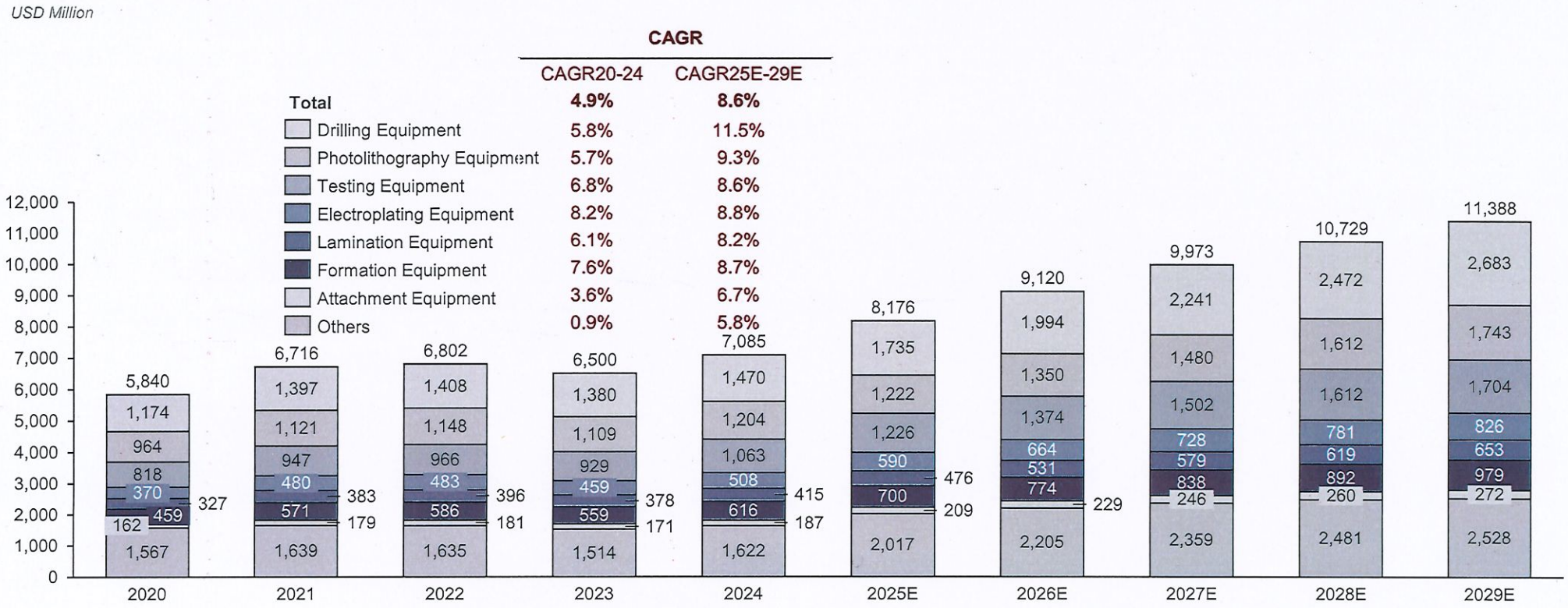
Analysis of Global Specialized PCB Equipment

Analysis

- The main development region for specialized PCB equipment include China, Taiwan China, Japan, South Korea and Americas, which together accounted for approximately 89.5% of global market size as of 2024. From 2020 to 2024, these regions recorded respective CAGR of 5.6%, 4.6%, 0.9%, 2.1% and 6.2%. The global specialized PCB equipment industry is undergoing a strategic shift towards emerging markets, with Southeast Asia market as the major hub for this transition. This shift is driven by cost competitiveness, favorable trade policies, and regional supply chain resilience, propelling the specialized PCB equipment market in Southeast Asia and other emerging market to achieve faster growth in the coming future.
- The global market size of the specialized PCB equipment increased from US$ 5,840million in 2020 to US$ 7,085million in 2024, representing a CAGR of 4.9%, and is projected to grow at a CAGR of 8.6% from 2025 to 2029, reaching US$ 11,388 million by 2029. As an important part of the global PCB industry, the market size of China's specialized PCB equipment industry increased from US$ 3,306million in 2020 to US$ 4,111million in 2024, representing a CAGR of 5.6% from 2020 to 2024, and market size of China's specialized PCB equipment industry is projected to grow at a CAGR of 8.2% from 2025 to 2029, reaching US$ 6,495 million by 2029.
- The global specialized PCB equipment industry is increasingly gravitating toward emerging markets in Southeast Asia, driven by cost efficiencies, supply chain diversification, and proximity to electronics manufacturing hubs. Singapore, positioned as a regional technology anchor, plays a pivotal role in this transformation through its advanced electronics manufacturing ecosystem and precision engineering capabilities. Singapore's manufacturing sector is primarily supported by the electronics industry, with precision engineering also playing a significant role. It is home to a considerable number of high-end manufacturing professionals, particularly those specializing in precision engineering
- China's specialized PCB equipment sector commands a major position globally. In 2024, the market size of China's specialized PCB equipment industry accounted for approximately 58% of the global market, and this share is expected to remain stable at 57% in 2029 despite the development of other emerging markets. Owing to this critical global role, leading specialized PCB production equipment manufacturers in China continue to reinforce their global competitive advantages.

Market Size of Global Specialized PCB Equipment

Market Size of Global Specialized PCB Equipment, by Equipment type, in Terms of Revenue, 2020-2029E



Source: Prismark, CIC

Analysis of Global Specialized PCB Equipment

Analysis

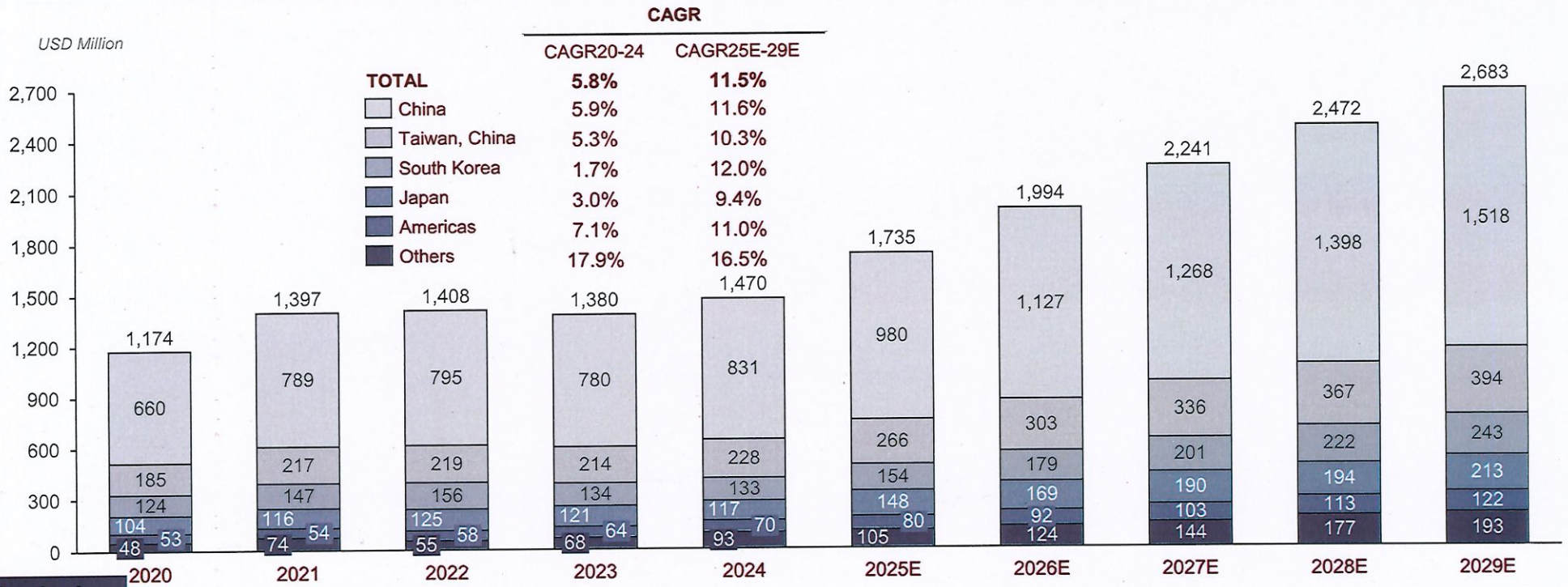
- The specialized PCB equipment market is undergoing a technology-driven transformation, characterized by precision upgrades, intelligent automation and capital intensity escalation, further accelerated by breakthroughs in AI technologies and automotive intelligence applications. This trend is expected to accelerate the market development and drive the market size of the specialized PCB equipment to reach US$ 11,388 million by 2029, representing a CAGR of 8.6% from 2025 to 2029. The Group has the most extensive product portfolio in the global PCB equipment industry, covering nearly all major PCB production processes such as drilling, photolithography, lamination, formation and testing.

- Unlike other specialized PCB equipment, which is primarily used for one-time operations, drilling and photolithography equipment require both more frequent use and a larger number of units compared to other specialized PCB production equipment. Consequently, the capital expenditure allocated to drilling and photolithography equipment in a single PCB production line accounts for over 30% of the total investment of specialized PCB production equipment.

- Driven by both technological advancements in PCB products and the expansion of downstream application scenarios, the growth potential for drilling and photolithography equipment markets is expected to further expand. As PCBs evolve toward higher density and layer counts, market demand for high-end PCB products such as high-multilayer boards and HDI boards continues to grow, imposing escalating requirements on the quantity and precision of drilling and photolithography equipment in their production processes.

Market Size of Global Drilling Equipment

Market Size of Global Drilling Equipment, by Region, in Terms of Revenue, 2020-2029E

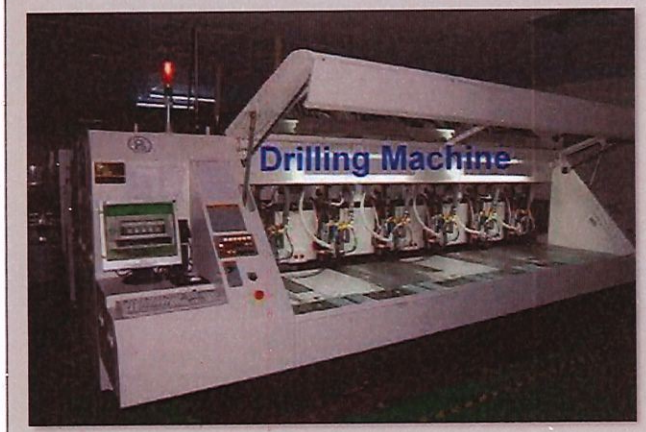


Analysis

- The global market size of the drilling equipment increased from US$1,174 million in 2020 to US$ 1,470 million in 2024, representing a CAGR of 5.8%, and is projected to grow at a CAGR of 11.5% from 2025 to 2029, reaching US$ 2,683 million by 2029. The market size of China's drilling equipment industry increased from US$660 million in 2020 to US$831 million in 2024, representing a CAGR of 5.9%, and is projected to grow at a CAGR of 11.6% from 2025 to 2029, reaching US$1,518 million by 2029. The Group is the global market leader in drilling equipment sector and was awarded "National Individual Champion Product" in 2022. In terms of revenue of the Group's drilling equipment in China, the Group enjoyed a market share of over 30% in China in 2024.

Source: Prismark, CIC

Analysis of Global Drilling Equipment



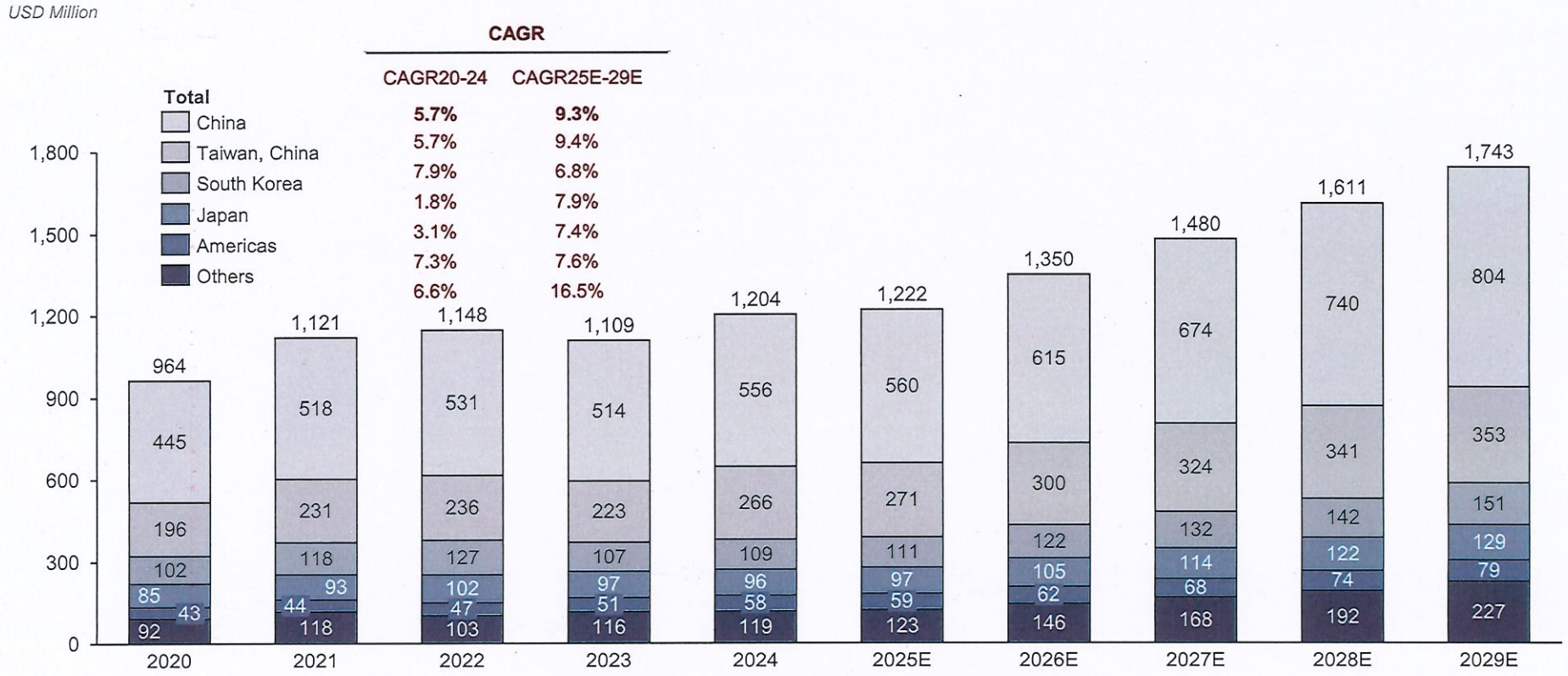
- The drilling process is a mission-critical stage in PCB production, enabling the creation of conductive vias that realize interlayer electrical connectivity in multi-layer board architectures through precision metallization plating. Aligning with industry standards, the Group provides both mechanical drilling equipment for apertures with a diameter ≥0.15mm utilizing proprietary micro-drill bit technology, and laser direct drilling systems for apertures with a diameter <0.15mm leveraging non-contact laser technology to achieve high-precision machining of tiny holes. Driven by trends in AI and automotive electrification, PCB designs have evolved to incorporate complex via structures, including through holes, blind vias, back drilling, and interlayer vias.

- The criticality of the drilling equipment lies in the mechanics of PCB signal transmission, which depends on interlayer vias. As PCBs evolve to accommodate more layers and higher via densities, the number of holes per board increases significantly. Drilling equipment is tasked with executing multiple high-precision operations on each board to create these vias. Consequently, as layer counts and via densities rise, the demand for drilling per PCB grows exponentially. To maintain production capacity, this escalating requirement necessitates the deployment of multiple drilling units operating in parallel within a single production line.

Source: CIC

Market Size of Global Photolithography Equipment

Market Size of Global Photolithograph Equipment, by Region, in Terms of Revenue, 2020-2029E



Source: Prismark, CIC

Analysis of Global Photolithography Equipment

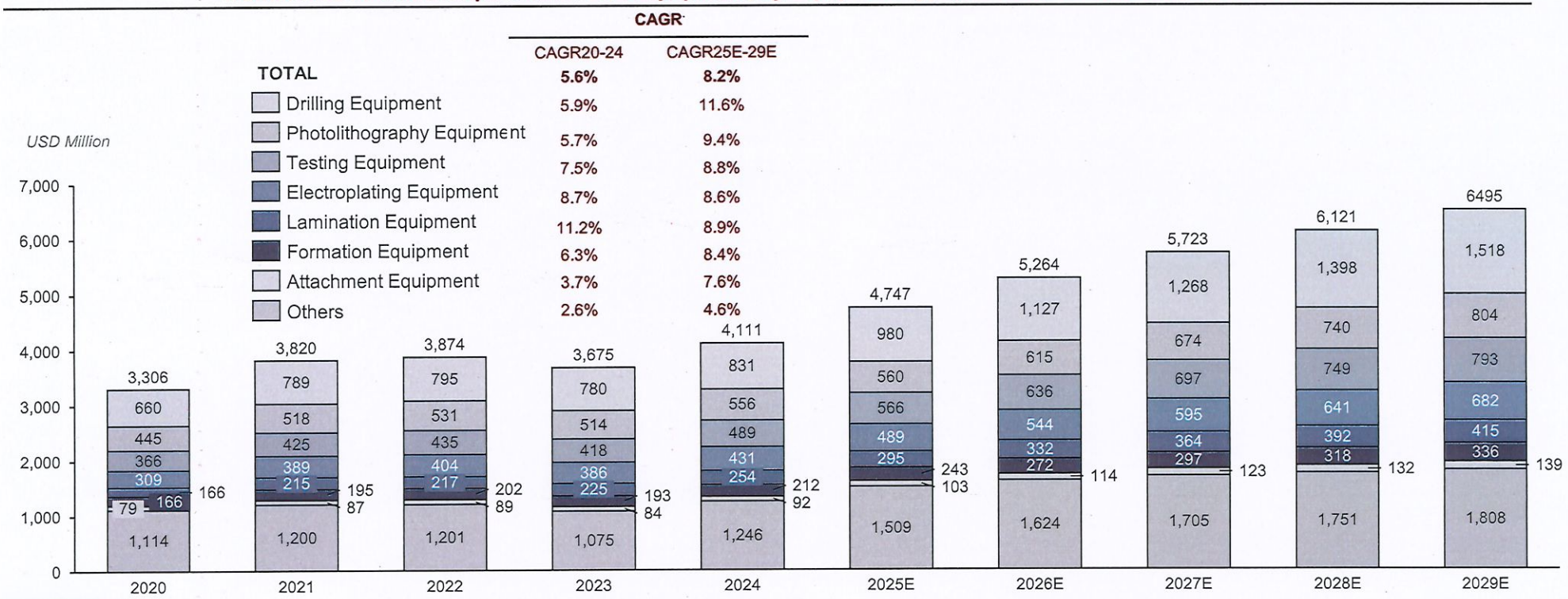
Analysis of Global Specialized PCB Equipment

Analysis

- The global market size of the photolithography equipment increased from US$964 million in 2020 to US$1,204 million in 2024, representing a CAGR of 5.7%, and is projected to grow at a CAGR of 9.3% from 2025 to 2029, reaching US$1,743 million by 2029.
- The growth of the market is mainly driven by the importance of photolithography equipment in a PCB production line. Firstly, each layer of PCB circuitry demands independent exposure to ensure precise pattern transfer. Additionally, HDI boards require multi-layer interconnection and additional exposure steps after single-layer processing to meet stringent production specifications. These dual demands ensure photolithography equipment's irreplaceable function in enabling complex PCB production process.

Market Size of China's Specialized PCB Equipment

Market Size of China's Specialized PCB Equipment, by Equipment type, in Terms of Revenue, 2020-2029E



Analysis

- The market size of the specialized PCB equipment in China increased from US$3,306 million in 2020 to US$4,111 million in 2024, representing a CAGR of 5.6% from 2020 to 2024, and the market size of the specialized PCB equipment in China is expected to reach to US$6,495 million in 2029, representing a CAGR of 8.2% from 2025 to 2029.

Source: Prismark, CIC

Trends and Drivers of the Specialized PCB Equipment Industry

Surging Demand for High-Precision and Miniaturized Equipment

- Driven by the continued adoption of generative AI, physical AI, and 5G, there is growing demand for high-value PCB products, such as high-multilayer boards, HDI boards, packaging substrates and multi-layer FPCs, across applications such as AI servers, autonomous driving computing modules, AI-powered smartphones, and optical transceivers. These advanced applications are accelerating the shift toward high-density and multilayer PCB architectures, raising precision requirements for equipment such as drilling machines to the micron level. Consequently, high-precision systems, including laser drilling equipment, are becoming core systems in modern PCB production.

Accelerated Equipment Export Driven by Global Supply Chain Restructuring

- Amid rising geopolitical tensions, trade policy shifts, and increasing production costs, the global PCB supply chain is undergoing rapid relocation to emerging manufacturing hubs such as Southeast Asia, India, and Mexico. This trend presents both challenges and opportunities for Chinese PCB equipment manufacturers. To effectively expand into overseas markets, companies must adapt to regional variations in technical standards, electrical specifications, environmental regulations, and service expectations. Developing modular, interoperable, and remote-service-capable equipment is becoming a strategic imperative. Intelligent machines equipped with plug-and-play configurations and remote diagnostics are gaining traction in new overseas factories, driving sustained growth in equipment exports and strengthening global competitiveness..

Strong Policy Support from National Industrial Initiatives

- As a foundational pillar of modern electronics production, PCB specialized equipment embodies the convergence of multidisciplinary technologies spanning mechanical systems, electrical engineering, optical precision, advanced control systems, and materials science. Recognized as a strategic priority within China's high-end equipment production road map, this sector has received substantial policy reinforcement in recent years. Major national initiatives, including 14th Five-Year Plan for Intelligent Manufacturing Development, have significantly emphasized governmental support for indigenous R&D breakthroughs, technological upgrading, and domestic substitution of critical electronic production equipment. These concerted efforts are not merely propelling technological innovation but are strategically accelerating the industry's evolution toward greater supply chain autonomy and high-quality development anchored in sustainable competitiveness.

PCB Production Capacity Expansion Drives Equipment Demand Surge

- Fueled by robust downstream demand in sectors such as AI, high-end consumer electronics, and new energy vehicles, the global electronics production supply chain is undergoing accelerated geographic consolidation, with China and Southeast Asia emerging as dominant strategic nodes in this structural realignment. As production capacity for PCB expands, demand for specialized PCB equipment has increased accordingly. The surge in equipment replacement across critical PCB production steps (photolithography, lamination, drilling, formation and testing) and the scale of equipment procurement in Southeast Asia's greenfield projects reflect transformative trends driven by technological advancement, regional industrialization, and market expansion.

Trends and Drivers of the Specialized PCB Equipment Industry

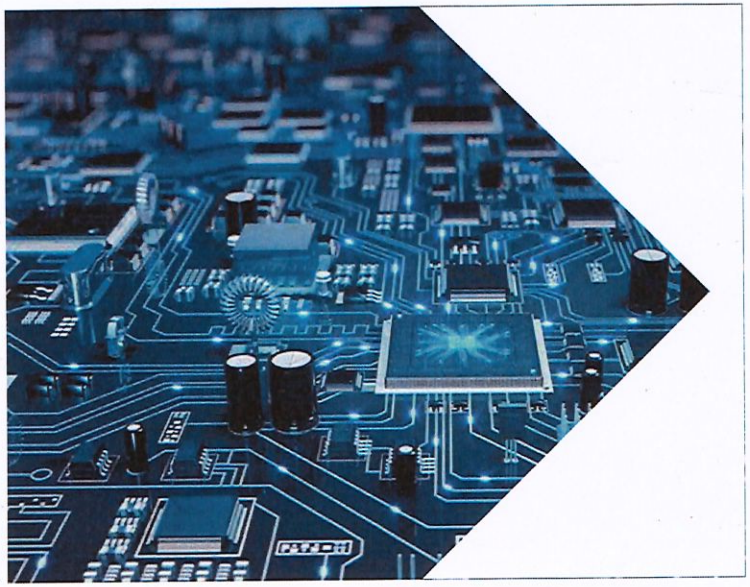
Ongoing Improvement in the International Competitiveness of China's Specialized PCB Equipment:

- China's specialized PCB equipment is rapidly enhancing its global competitiveness through technological advancement and industrial upgrading. Supported by favorable policies and accumulated expertise, China's specialized PCB equipment is expected to be widely accepted and acquire additional market share in the global high-end market. This development will significantly enhance China's specialized PCB equipment's influence in the global PCB industry

PCBs in AI-related sectors are expected to become a key growth driver over the next few years, significantly boosting demand for high value-added production equipment

- With the rapid advancement of AI large models and intelligent hardware applications, demand for computing infrastructure is surging, which in turn is driving substantial growth in demand for high-performance servers, GPUs, and advanced PCBs. AI-specific devices place higher requirements on PCBs such as increased layer counts, high-frequency and high-speed signal transmission, and precision production thus accelerating the demand for high-end, value-added PCB products. This trend is expanding the market for specialized PCB equipment.

Content



Competitive Landscape of Global and China's Specialized PCB Equipment Industry

Rankings of Global specialized PCB production equipment manufacturers , in terms of revenue(1), 2024

Ranking	Company	Description	Revenue (RMB billion)	Market Share
1	The Group	• **The Group is a solutions provider of specialized PCB production equipment. The Group has a product portfolio, covering nearly all major PCB production processes such as drilling, photolithography, lamination, formation and testing.**	3.3	6.5%
2	Company A	• Headquartered in Japan, the Competitor A has a history of over a century in operations, primarily focusing on automotive electronics, telecommunications equipment, and industrial automation applications. The Competitor A is listed on the Tokyo Stock Exchange. In the global specialized PCB equipment market, The Competitor A engages in the R&D, production, and sales of drilling equipment, which are primarily used in the HDI board and IC packaging substrate markets.	~2.5	4.9%
3	Company B	• Headquartered in the United States, the Company B is a leading player in the advancing electronics industry through its expertise in semiconductor process control and the production of high-precision electronics equipment. The Company B was listed on the NASDAQ. In the global specialized PCB equipment market, The Competitor B mainly provides AOI equipment and LDI systems for global customers.	~2.0	3.9%
4	Company C	• Headquartered in the United States, the Company C is a leading provider of foundational technology solutions for advanced semiconductor production, electronics and packaging, as well as specialized industrial applications. The Company C was listed on the NASDAQ. In the global specialized PCB equipment market, The Competitor C mainly provides laser drilling equipment for global customers.	~1.5	2.9%
5	Company D	• Headquartered in the Germany, the Company D is primarily engaged in the development of high-precision mechanical drilling machines, laser cutting equipment, and metrology systems. The Company D is a privately held company.	~1.4	2.7%
Total of the top five companies			**~10.7**	**20.9%**

- The global specialized PCB equipment industry exhibits a relatively fragmented competitive landscape, with the top five global market players collectively accounting for approximately 20.9% of the total market share in terms of revenue in 2024.
- The key market players include well-known electronics instrumentation manufacturers that also supply specialized PCB production equipment, alongside market participants that similar to us that are dedicated to the development of the specialized PCB equipment.
- **The Group rank the first among all specialized PCB production equipment manufacturers globally in terms of sales revenue in 2024, capturing approximately 6.5% of the market.** The Group also has the most extensive product portfolio in the global PCB equipment industry, covering all major PCB production processes such as photolithography, lamination, drilling, formation and testing.
- The Group may face increasing competition from emerging companies that may expand the scale of their operations. In addition, some of existing and new competitors of the Group may have greater financial, marketing, technical or other resources than us. Greater resources may allow such competitors to respond to changes in market demand more quickly and produce and sell new or more advanced products, as well as better withstand downturns in the markets where the Group operated. Intense competition may also lead to further consolidation in the industry. Our competitors may enter into strategic alliances such as business partnerships or joint ventures, which may enable certain competitors to further benefit from greater economies of scale and more effectively compete against the Group.

Sources: Annual reports of companies pursuant to laws and regulations of where their shares were listed, CPCA, CIC.

Note:

(1) Represents global revenue in 2024.

Competitive Landscape of Global and China's Specialized PCB Equipment Industry

Rankings of China's specialized PCB production equipment manufacturers , in terms of revenue(1), 2024

Ranking	Company	Description	Revenue (RMB billion)	Market Share
1	The Group	• **The Group is a leading global solutions provider of specialized PCB production equipment. With over 20 years of dedicated experience in the specialized PCB equipment industry, the Group continuously research and develop technical processes in PCB production.**	3.0	10.1%
2	Company A	• Headquartered in Japan, the Competitor A has a history of over a century in operations, primarily focusing on automotive electronics, telecommunications equipment, and industrial automation applications. The Competitor A is listed on the Tokyo Stock Exchange. In the global specialized PCB equipment market, The Competitor A engages in the R&D, production, and sales of drilling equipment, which are primarily used in the HDI board and IC packaging substrate markets.	~1.5	5.1%
3	Company E	• Headquartered in China, Competitor E has over 36 years of industry experience and mainly provides chemical wet process equipment, such as electroplating and etching equipment.	~1.3	4.4%
4	Company F	• Headquartered in China, the company is a high-end equipment production company specializing in the research, development, and production of direct imaging and maskless lithography equipment. The Company F was listed on the Shanghai Stock Exchange.	~0.8	2.6%
5	Company G	• Headquartered in China, the company specializes in the research and development, design, production, and sales of high-end precision electroplating equipment and its supporting systems. The Company G was listed on the Shanghai Stock Exchange.	~0.5	1.7%
Total of the top five companies			~7.1	23.9%

- The specialized PCB equipment industry in China remains characterized by a fragmented competitive landscape, with the top five domestic manufacturers collectively holding approximately 23.9% of the total market share in 2024. Within this decentralized environment, **the Group emerged as the market leader, ranking first among specialized PCB production equipment manufacturers in China by sales revenue in 2024, capturing approximately 10.1% of the domestic market.**

Sources: Annual reports of companies pursuant to laws and regulations of where their shares were listed, CPCA, CIC.
Note:
(1) Represents revenue in China in 2024.

Entry Barriers and Key Success Factors for the Specialized PCB Equipment Industry

Technological Barriers

- To achieve high precision, multi-functionality, and rapid iteration, specialized PCB production equipment manufacturers must establish solid technological barriers. Building these barriers relies on continuous R&D investment, the accumulation of experience by core teams, and strategic patenting. As market demand for high precision equipment continues to rise, manufacturers with strong technological barriers will be able to meet the increasing demands of downstream clients for high-quality, reliable equipment, thereby gaining a competitive edge.

Product Portfolio Barriers

- PCB production involves multiple steps that require the coordination and integration of specialized equipment. To meet diverse customer needs and enhance market competitiveness, equipment suppliers must establish a comprehensive and diversified product portfolio covering various stages of the PCB production process. By continuously optimizing and expanding their product lines, suppliers can meet diverse market demands, offer more convenient integrated services, reduce procurement and production costs for clients, and improve the customer experience.

Capital Barriers

- To meet the ever-increasing demands for precision, efficiency, and automation in PCB production processes, specialize PCB equipment suppliers should make sustained, large-scale investments in core technology development and iterative upgrades. In addition, leading PCB manufacturers impose stringent requirements on suppliers regarding qualifications, operational stability, and after-sales service capabilities. The specialized PCB equipment supplier validation process often involves several months — or even years — of testing and evaluation, placing significant pressure on a supplier's cash flow and long-term operational resilience.

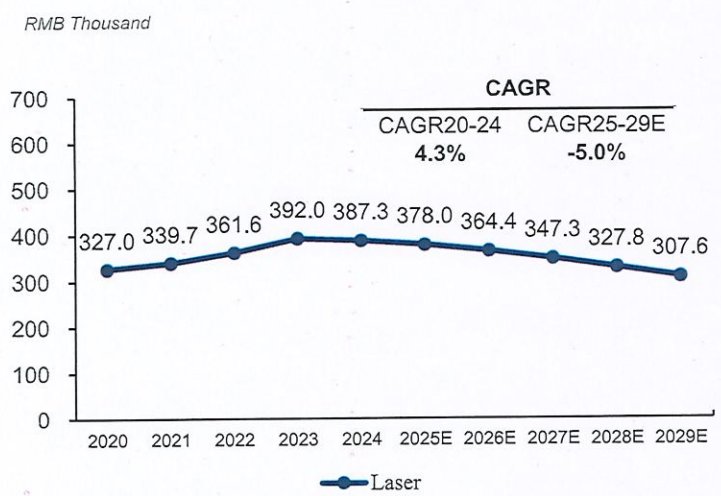
Customer Resource Barriers

- In the PCB production industry, large customers have extremely high requirements for equipment quality, delivery times, and after-sales service. Once equipment suppliers gain the trust of these customers through reliable product performance and in-depth, tailored services, they establish a strong customer resource barrier. This trust not only secures long-term orders but also enhances brand influence through word-of-mouth marketing, leading to more business opportunities in the market.

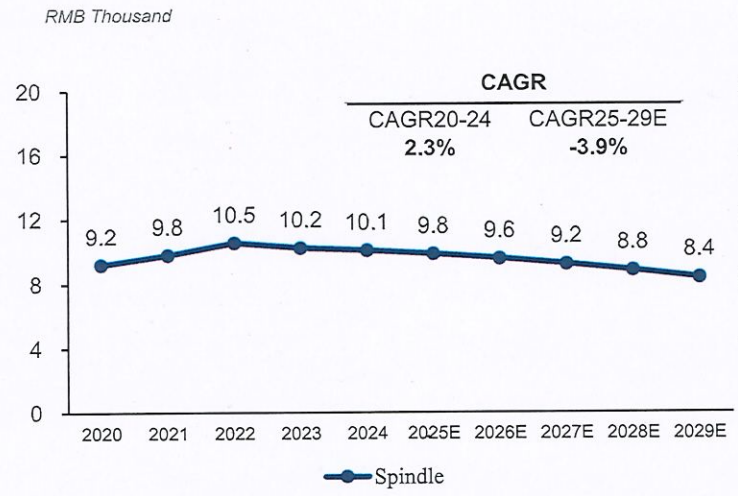
Source: CIC

Analysis of Raw Material Prices in China's Specialized PCB Equipment Industry

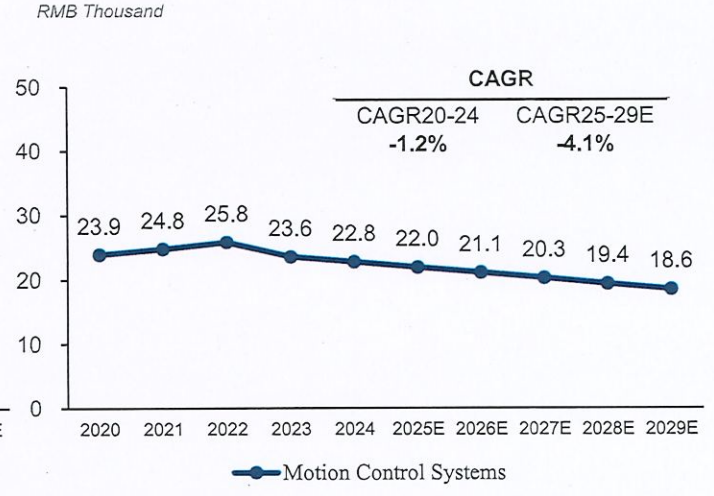
Historical and Forecasted Price Changes of Lasers for Specialized PCB Equipment, 2020–2029E



Historical and Forecasted Price Changes of Spindles for Specialized PCB Equipment, 2020–2029E



Historical and Forecasted Price Changes of Motion Control Systems for Specialized PCB Equipment, 2020–2029E



Lasers, spindles, and motion control systems constitute the foundational raw materials for specialized PCB production equipment. Laser systems serve as the primary energy mechanism for drilling equipment, enabling ultra-precision microvia formation. Spindles are critical for maintaining rotational stability during drilling process, directly impacting hole wall integrity by minimizing defects such as burring or delamination, particularly in HDI and IC substrate manufacturing. The motion control system facilitates coordinated multi-axis movement, thereby reducing deviation in drilling trajectories. Historically, these raw materials were predominantly supplied by overseas manufacturers. However, accelerated localization in China, driven by domestic technological advancements and supply chain resilience efforts, has significantly reduced dependency. Consequently, price fluctuations for these raw materials are influenced by macroeconomic conditions, localisation process, and supply-demand dynamics of critical components. The prices of lasers, spindles, and motion control systems demonstrated a general upward trend from 2020 to 2022, peaking in 2022. This surge was primarily attributed to induced supply chain disruptions due to COVID-19, including prolonged material delivery delays and factory shutdowns, that constrained global supply. Unlike spindles and motion control systems, whose prices began a gradual decline after 2022, the price of laser rose by 8.4% in 2023 compared to 2022. This divergence was driven by global supply constraints of laser components. Looking ahead, as supply-demand dynamics gradually stabilize and localisation accelerates, the prices of these core raw materials for China's specialized PCB production equipment are expected to exhibit a downward trend.

Sources: GACC, CIC

Analysis of Raw Material Prices in China's Specialized PCB Equipment Industry

- Potential pricing fluctuations in the raw materials can arise due to factors including global and domestic economic conditions, governmental regulations, supply-demand dynamics and geopolitical conditions. In procuring raw materials from suppliers, most of the companies in the industry generally adopt a one-time pricing model. The one-time pricing model sets a fixed price during the term of a contract, providing certainty for both parties.

- The price increases in laser equipment, spindles, and motion control systems during 2020–2022, as mentioned in the Industry Overview, primarily reflect short-term supply chain tightness caused by COVID-19, including delays in material deliveries and temporary factory shutdowns. Such price fluctuations represent short-term industry-level supply constraints and do not equate to a halt in production or a reduction in overall market demand. The market size of Chinas specialized PCB equipment maintained a steady growth trend from 2020 to 2022, and the overall market was not materially affected by the COVID-19.

Note: Additionally, factors that are beyond our control, including natural disasters, public health hazards, civil unrest, wars, strikes or trade sanctions or restrictions, may impact the supply and market price of raw materials.

Market Summary

- The description "specialized" PCB equipment is accepted and in the industry. This term is commonly applied to describe equipment dedicated to various stages of PCB manufacturing, such as drilling, exposure, and etching. Compared with general-purpose equipment, these machines are highly specialized and tailored to meet the specific process requirements of PCB production. For example, relevant industry associations and organizers of electronics trade exhibitions have also adopted this term in their published materials.

  The following links are provided for reference, illustrating the use of the term "specialized" PCB equipment in the industry:

  Link1(China Printed Circuit Association): https://www.cpca.org.cn/news/show-5737.html
  Link2(Nepcon Asia): https://www.nepconasia.com/zh-cn/news-center/news/2024/11/37.html

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Thank you.