

Global and China Industrial X-Ray Inspection Equipment Market Research Report

—— The “GUN trio”: Pioneering the Future, Leading the Industry

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FROST & SULLIVAN

沙利文

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Introduction

In the global competitive landscape, X-ray inspection equipment companies each have their own advantages in different application fields and detection accuracy levels. Represented by three companies—GE (Baker Hughes), Unicom, and Nordson—the "GUN trio" has led the industry development with outstanding performance in areas such as comprehensive product portfolio across all scenarios, core technology development, cross-domain integrated services, and market competitiveness.

The professionalism and precision demonstrated by the "GUN trio" in the market have provided significant value and leadership for the development of the X-ray inspection equipment industry. In market competition, companies need to possess deep expertise and skills, a well-rounded product matrix, the ability to innovate rapidly, and a strong market position. The globally leading "GUN trio" has stood out amid intense and complex competition, contributing to the advancement of the industry.

Looking ahead, the professionalism and innovation demonstrated by the "GUN trio" will help foster healthier market development and maintain long-term competitiveness. By presenting the "GUN trio" as a model to the market, Frost & Sullivan aim to provide a development benchmark for the X-ray inspection equipment industry and support the industry in achieving sustainable growth.

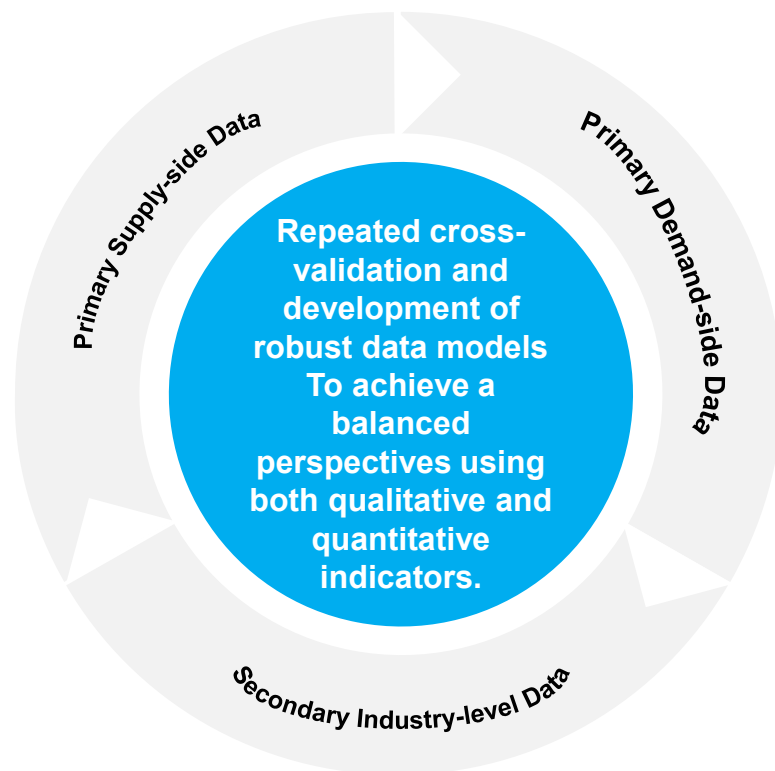
Research Scope

Time Scope	
Historical Years	2020-2024
Base Year	2024
Forecast Years	2025-2030

Geographical Scope	
Global	Major global industrial regions
China	Mainland China (excluding Hong Kong, Macau, and Taiwan)

Product Scope	
Product Type	Industrial X-Ray inspection equipment and key components
Application Fields	Industrial sectors including semiconductors, electronics manufacturing, new energy batteries, food and beverage inspection, security inspection, as well as castings and welded parts, materials, mineral processing, power, archaeology, and other general industrial fields (excluding medical applications)

Research Methodology



- **Primary Supply-side Data**
 - ✓ Tracking of leading industry players
 - ✓ Real-time expert network follow-ups
 - ✓ First-hand interviews with upstream manufacturers
- **Primary Demand-side Data**
 - ✓ Real-time research on key downstream players
 - ✓ Random intercept interviews with downstream players
 - ✓ In-depth interviews with downstream players
- **Secondary Industry-level Data**
 - ✓ Industry reports and white papers
 - ✓ Corporate annual reports and public disclosure databases
 - ✓ Government and industry association publications

- We employ a systematic approach to data, information, and source collection, covering a wide range of sub-industry demands to accurately match relevant data resources and efficiently gather required information.
- Our research adopts diverse and rigorous methods, covering supply-side and demand-side primary sources as well as industry-level secondary data. We ensure balanced qualitative and quantitative insights through cross-validation and establishing robust data models. Our internal quality control system will continuously monitor and validate every data output and analytical conclusion in real time.



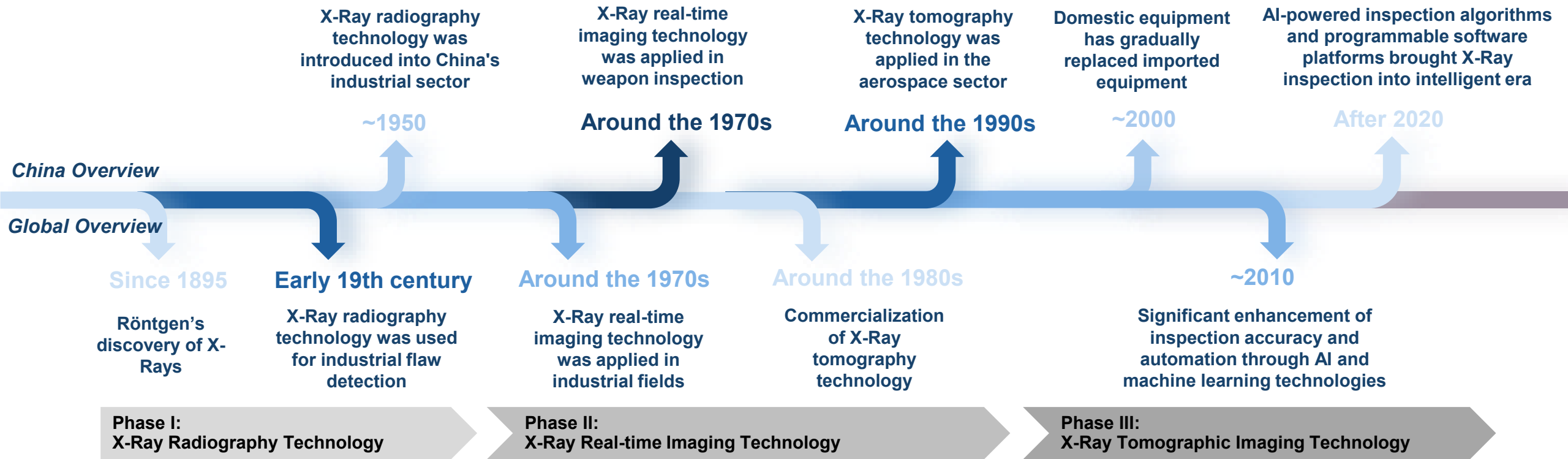
1 Current Development of the Global and China Industrial X-Ray Inspection Equipment Industry

2 The “GUN trio”: Pioneering the Future, Leading the Industry

3 Appendix

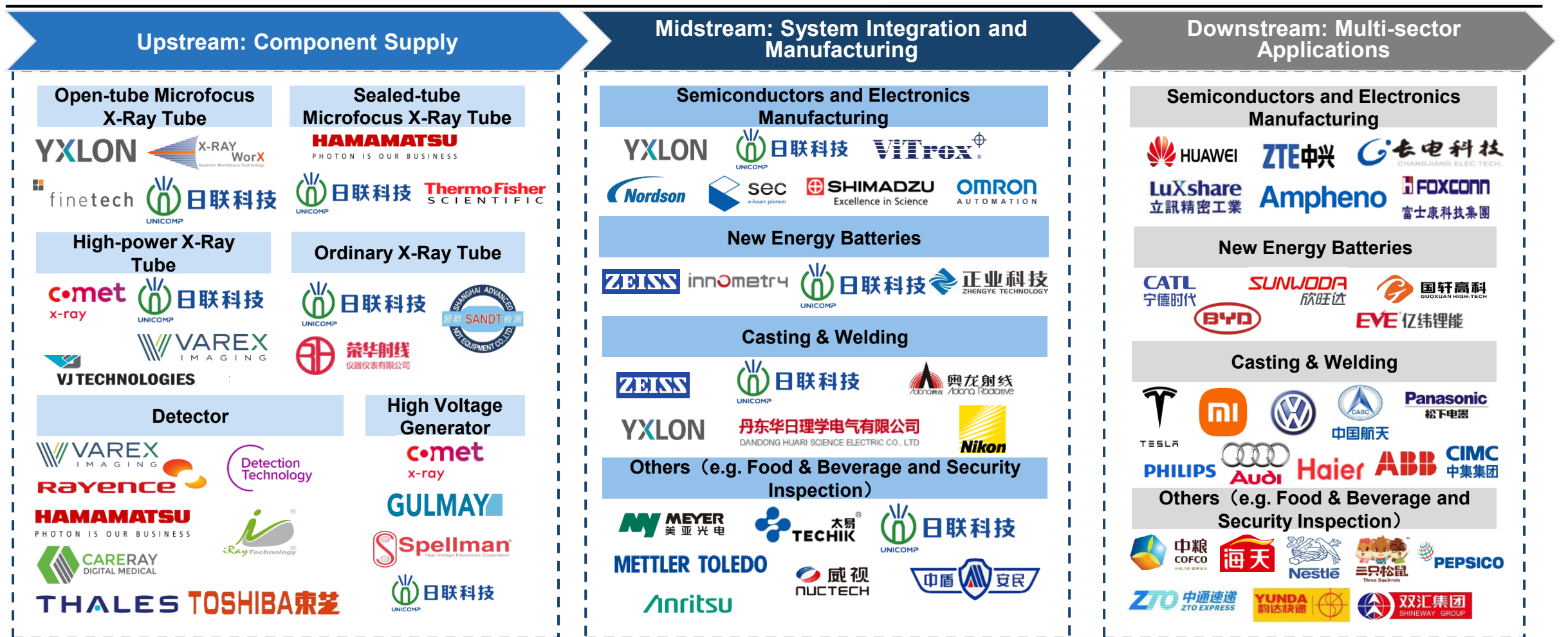
Global industrial X-Ray inspection was once under western dominance, but Chinese firms, after mastering core technologies, are now expanding overseas and gaining market share

- As a key method of non-destructive testing (NDT), X-Ray inspection **provides intuitive imaging with high speed, accuracy, and visibility**, and is widely applied across various industries. Since the discovery of X-Ray by Röntgen in 1895, the global industrial X-Ray inspection has long been dominated by companies from Europe, the U.S., and Japan. China entered the field relatively late, initially relying on imported core equipment and facing constraints in critical technologies. **Since the 21st century, driven by the rise of domestic industries such as semiconductors and new energy, Chinese companies have gradually achieved breakthroughs technologies like X-Ray tubes and detectors.**
- In recent years, Chinese companies such as UNICOMP Technologies have led the development of large-scale AI models for industrial X-Ray inspection, greatly enhancing accuracy and efficiency. **As a result, China has become a strong global player in intelligent inspection, shifting from a technology follower to an innovation leader.**



UNICOMP is the only Chinese company to achieve industrialization of self-developed X-Ray tubes and intelligent inspection equipment manufacturing, with large-scale cross-industry applications that are reshaping the global X-Ray inspection landscape

Competitive Landscape of the X-Ray Inspection Equipment Industry



Note: 1. YXLON is a member of the COMET Group.

While X-Ray inspection equipment serves diverse sectors from semiconductors to food production, Chinese companies now dominate global battery applications and are making rapid inroads into high-end semiconductor markets

Segmented Market Applications of X-Ray Inspection Equipment

Semiconductor

The semiconductor industry imposes most stringent requirements on X-Ray inspection equipment, primarily in wafer fabrication and packaging and testing stages. Precision equipment require nanometer-level resolution, using microfocus X-Ray tube and high-sensitivity CMOS detectors to identify microscopic defects such as TSV voids and cold solder joint. The high-end market remains dominated by western players, **with limited domestic share, though Chinese companies such as UNICOMP are beginning to break through.**

New Energy Batteries

X-Ray inspection equipment for new energy batteries must **balance penetration power (130–180 kV) and inspection speed**, with typical focal spot sizes of 5–80 μm . It is mainly used for quality control of electrode alignment, separator defects, and other critical controls. **Chinese manufacturers hold approximately 75% of the domestic market**, representing the highest level of localization. As solid-state battery technology advances, there are increasing requirements for higher precision, speed, 3D imaging, and online inspection.

Food & Beverage Production

In the food and beverage industry, X-Ray inspection equipment is primarily used for **detecting foreign objects, packaging defects, and internal structural issues**, with resolution requirements above 0.1 mm. The systems must accommodate various packaging forms. All equipment **supports high-speed online inspection**, with **AI-based automatic sorting** available on high-end production lines. western brands such as METTLER TOLEDO still hold portions of the global high-end market.

Electronics Manufacturing

In electronics manufacturing, X-Ray inspection equipment is mainly used for **solder joint analysis and component misalignment detection**. As PCBA density increases, demand for 3D/CT inspection is rising, driving the shift toward higher automation. **Domestic equipment has achieved over 80% substitution in the mid- to low-end market, and with technological advances from companies like UNICOMP, domestic adoption in high-end 3D inspection continues to grow.**

Casting and Welding

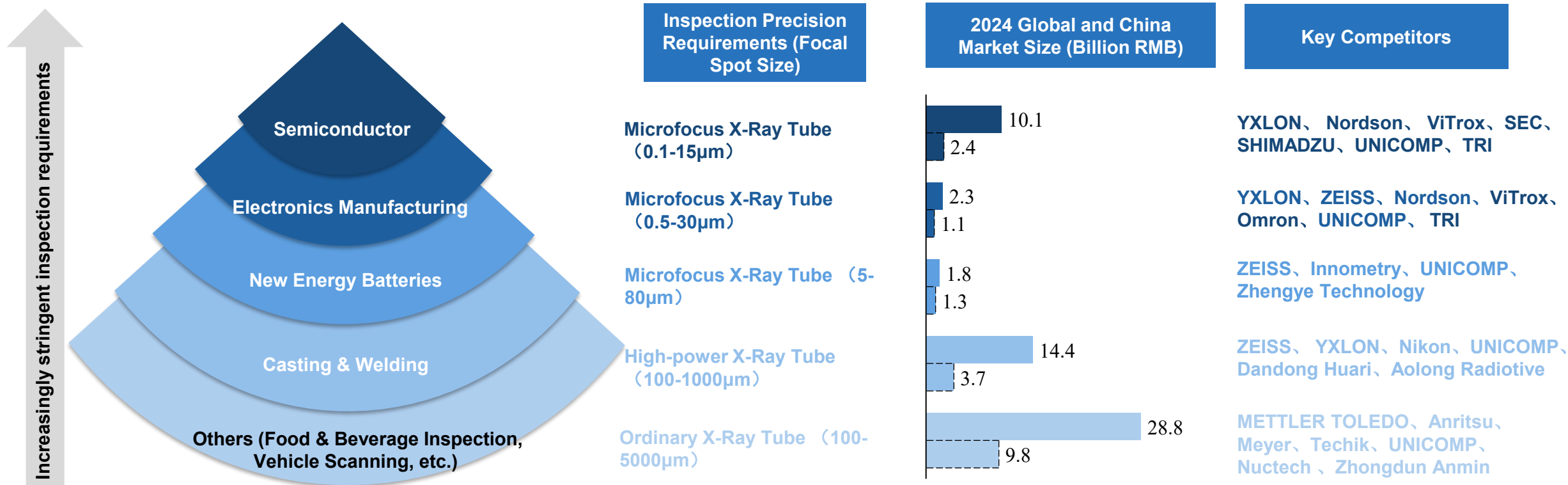
X-Ray inspection of castings and welded parts primarily targets **thick metal parts such as automotive die-cast parts and aerospace components**, requiring high-energy X-Ray (160–500 kV) and focal spot sizes of 100–1000 μm . While the global high-end market remains dominated by western players such as YXLON and ZEISS, **domestic companies is steadily gaining ground with notable cost-performance advantages.**

Security Inspection

X-Ray inspection equipment for security applications requires **high penetration capacity (160–225 kV) and 24/7 operational capability**, with focal spot sizes of 1–5 mm. 3D screening systems are rapidly being adopted in airports and other critical locations, enabling 3D identification of hazardous items. **Chinese manufacturers now dominate the domestic market, with a localization rate exceeding 80%.**

Divergent performance needs in X-Ray inspection applications force parameter-specific equipment designs, allowing companies to cultivate niche advantages in targeted sectors

- **Different downstream application sectors have distinct requirements for X-Ray equipment performance parameters and equipment size.** Key differences are especially notable in focal spot size and tube current of the X-Ray tube. **Precision inspection equipment are commonly used in semiconductor and electronics as well as new energy battery inspection**, where stringent requirements are placed on focal spot size for micro-scale resolution. In castings and welded sector, high-penetration systems are preferred, requiring high-penetration inspection equipment but with less stringent requirements on focal spot size. In other fields—such as food and beverage inspection, mineral processing, tobacco, vehicle scanning, logistics, and security inspection—ordinary inspection equipment is widely used, emphasizing high inspection speed and operational efficiency.



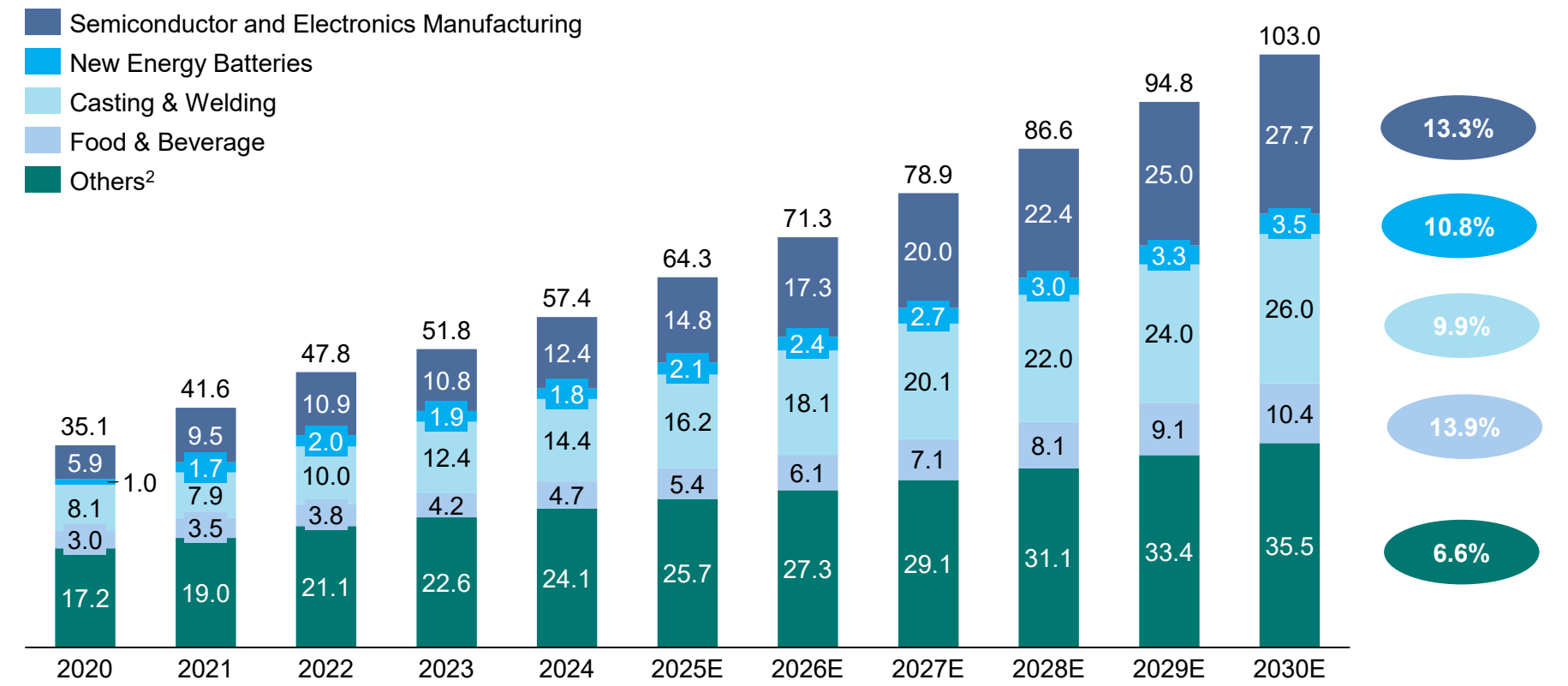
The global industrial X-Ray inspection equipment market is experiencing sustained growth, projected to exceed RMB 100 billion by 2030, driven particularly by strong momentum in semiconductor, new energy battery, and food and beverage inspection segments amid broader industry expansion

Global Industrial X-Ray Inspection Equipment Market Size¹ by Downstream Application (2020–2030E)



Key Insights

Unit: Billion RMB



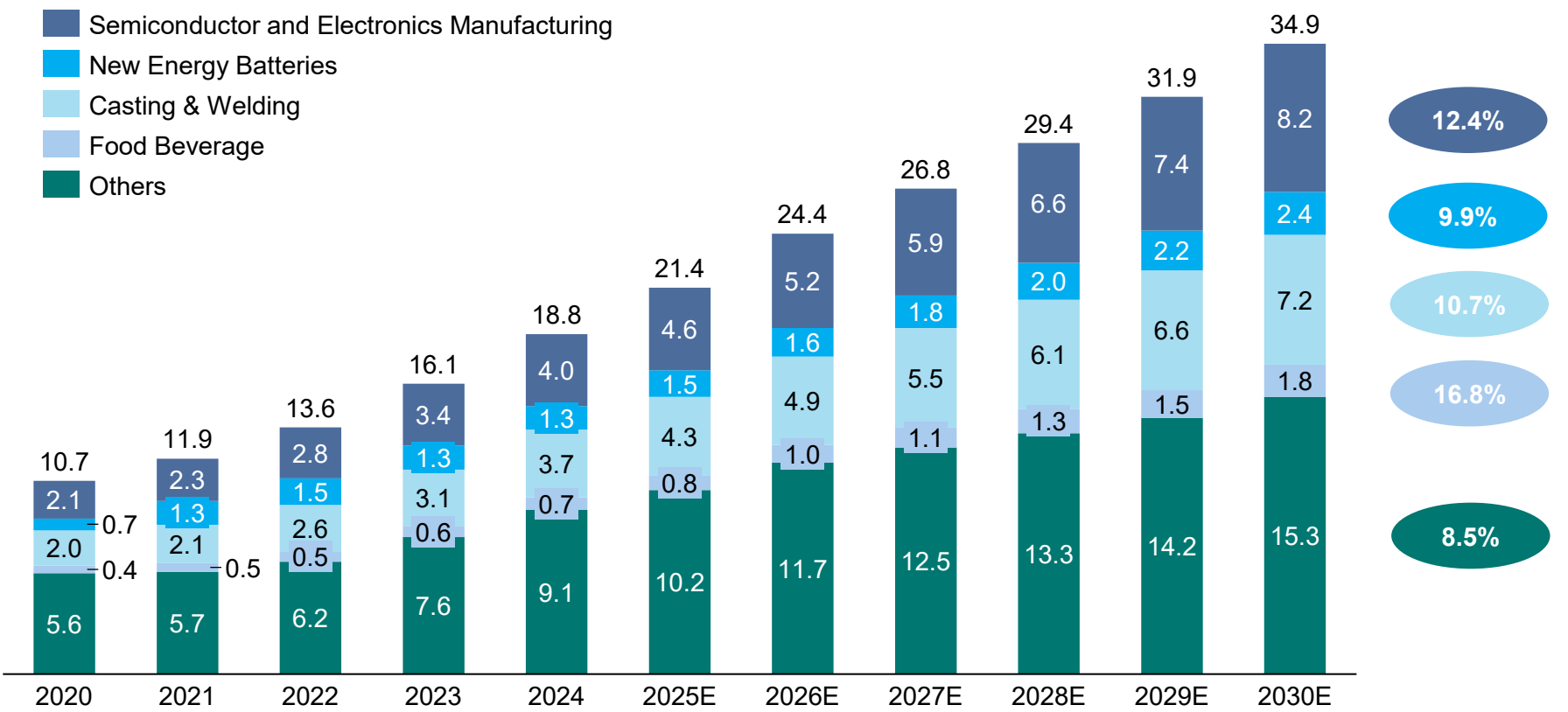
- The global industrial X-Ray inspection equipment market has shown strong growth momentum, recording a **CAGR of 13.1% from 2020 to 2024, and is projected to grow at a CAGR of 9.9% from 2025 to 2030.**
- Among downstream application sectors, the semiconductor and electronics manufacturing segment leads with a CAGR of 20.6% from 2020 to 2024 and is expected to maintain a robust 13.3% CAGR over the next five years. Meanwhile, the new energy battery segment — benefiting from the rapid expansion of the electric vehicle, energy storage, and consumer electronics industries — achieved a CAGR of 15.9% from 2020 to 2024 and is projected to grow at 10.8% annually through 2030.
- In 2024, the global industrial X-Ray inspection equipment market reached approximately RMB 57.4 billion and is expected to surpass RMB 100 billion by 2030.

Note:
1. The industrial X-Ray inspection equipment market excludes the medical sector.
2. "Others" mainly refers to inspection applications in fields such as security, unless otherwise specified.

China's industrial X-Ray inspection equipment market continues rapid growth — fueled by robust downstream demand and accelerating localized production — with a projected 10.3% CAGR over the next five years to exceed RMB 30 billion by 2029

China Industrial X-Ray Inspection Equipment Market Size by Downstream Application (2020–2030E)

Unit: Billion RMB



Key Insights

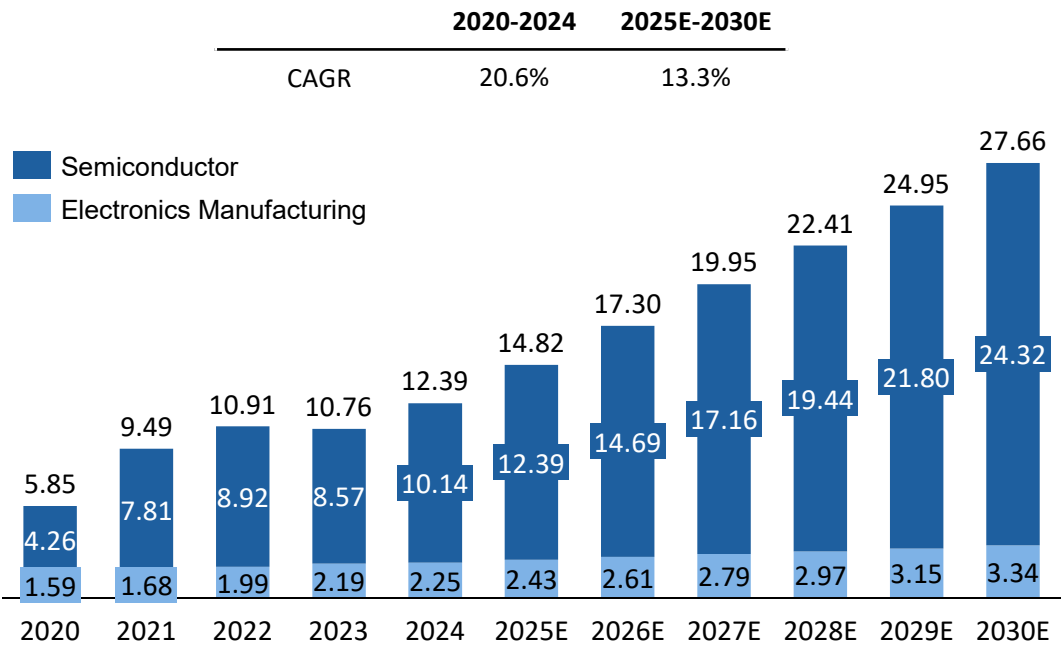
- China's industrial X-Ray inspection equipment market has maintained strong growth, **with a CAGR of 15.1% from 2020 to 2024, and is projected to grow at a CAGR of 10.3% over the next five years.**
- Driven by the rapid expansion of China's new energy sector, the new energy battery segment has been particularly strong, achieving a CAGR of 18.5% from 2020 to 2024 and expected to maintain a high growth rate of 9.9% in the coming five years. The food and beverage inspection market is also expected to grow rapidly, **with a projected CAGR of 16.8% over the next five years.** Meanwhile, significant advances in domestic R&D capabilities are accelerating the pace of localized production, further stimulating demand for X-Ray inspection equipment across all downstream application sectors.
- In 2024, the market size reached approximately RMB 18.8 billion and is expected to surpass RMB 30 billion by 2029.

In semiconductor and electronics manufacturing sector, domestic high-end X-Ray inspection equipment accounts for about 5% of the market, with great potential for growth.

X-Ray inspection equipment is widely used in the semiconductor and electronics manufacturing sectors for critical processes such as wafer inspection, chip packaging inspection, and PCBA solder joint quality inspection. It enables non-destructive, high-precision quality control and defect detection. As China's semiconductor industry chain continues to improve and manufacturing processes become increasingly complex, there is growing demand for higher performance, greater automation, and localized service capabilities in X-Ray inspection equipment. This trend is accelerating technological breakthroughs in domestic equipment and the substitution of imports. In the high-end segment, the current market penetration rate of domestic equipment is only around 5%, indicating significant growth potential and development prospects. In 2024, the market size of X-Ray inspection equipment in China's semiconductor and electronics manufacturing sector is expected to reach RMB3.98 billion, with a projected CAGR of 12.4% from 2025 to 2030.

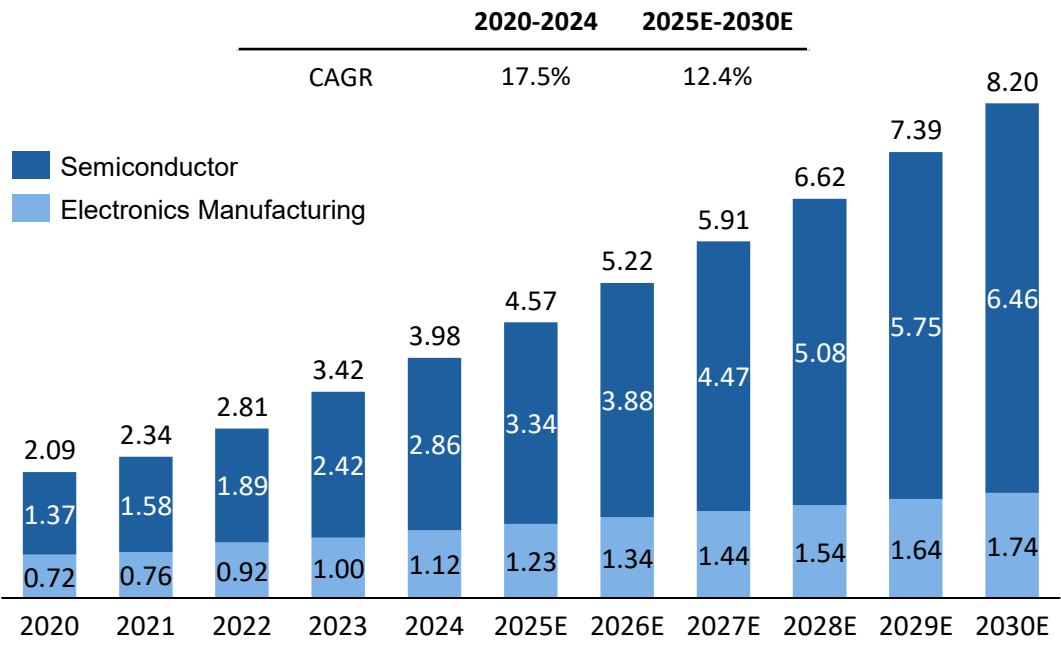
Market Size of X-Ray Inspection Equipment in Global Semiconductor and Electronics Manufacturing Sector, 2020–2030E

Billion RMB



Market Size of X-Ray Inspection Equipment in China's Semiconductor and Electronics Manufacturing Sector, 2020–2030E

Billion RMB

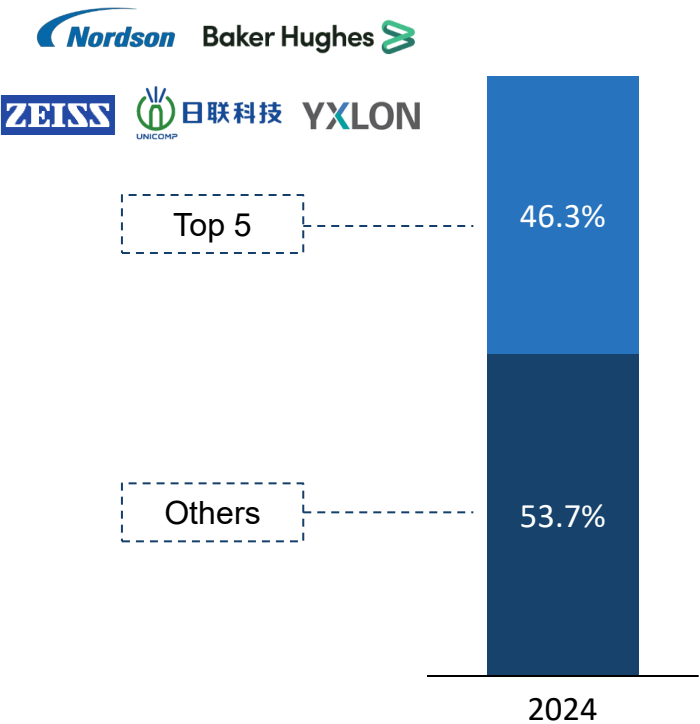


China’s semiconductor and electronics manufacturing X-Ray inspection equipment market is still dominated by foreign companies. However, Unicom, as a leading domestic player, has made breakthroughs in high-end semiconductor inspection equipment, emerging as a key force in driving domestic substitution.

In terms of revenue in 2024, the X-Ray inspection equipment market in China’s semiconductor and electronics manufacturing sector is highly concentrated, with the top five companies accounting for a combined market share of 46.3%. The market is predominantly occupied by foreign firms, while Chinese companies hold a total share of 14%. Among them, Unicom, as a leading domestic player, has achieved breakthroughs in high-end semiconductor inspection equipment through technological innovation, becoming a key force in domestic substitution.

Market Concentration of X-Ray Inspection Equipment in China’s Semiconductor and Electronics Manufacturing Sector, 2024

Market Concentration by Annual Revenue



Competitive Landscape of X-Ray Inspection Equipment in China’s Semiconductor and Electronics Manufacturing Sector, 2024

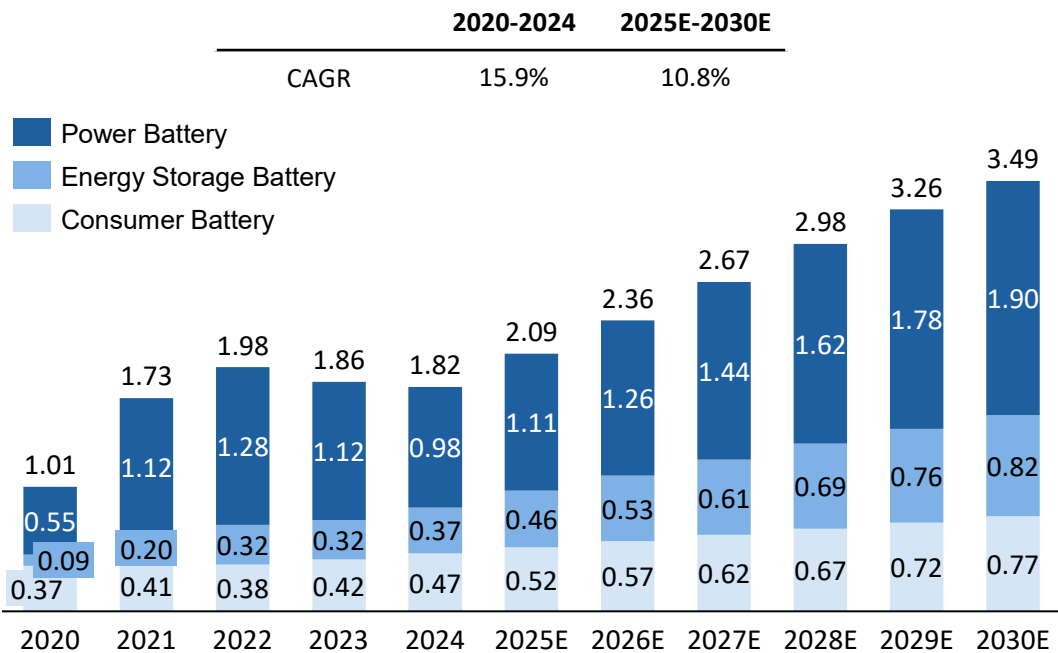
Market Share by Annual Revenue

Market Share	Company Name	Company Introduction
>10%	Nordson Corporation	A global leading provider of precision technology solutions, offering innovative equipment, systems, and services to multiple industries. It was founded in 1954 and listed on NASDAQ in 1979.
	Baker Hughes	A global leading energy technology company, whose industrial nondestructive testing business is managed by its subsidiary Waygate Technologies, offering solutions such as X-Ray inspection, industrial CT, visual inspection, and industrial ultrasonic testing. It was founded in 1987 and listed on NASDAQ in 2021.
5%-10%	Unicom Technology (Group) Co., Ltd.	A leading Chinese supplier of industrial X-Ray intelligent inspection equipment and core components, with products and technologies primarily applied in inspection fields such as integrated circuits and electronics manufacturing, new energy batteries, castings and welding. It was founded in 2009 and listed on the SSE in 2023.
	Carl Zeiss AG	Founded in 1846, it is a globally leading German company specializing in the manufacturing of optical and optoelectronic equipment, focused on the development, production, and sales of measurement technology, microscopes, medical technology, eyeglass lenses, and semiconductor manufacturing equipment.
	Comet Yxlon	Founded in 1998, it is a globally leading manufacturer of industrial X-Ray and CT system solutions, with products primarily used in the aerospace, automotive, and electronics industries.
<5%	Others	Test Research, Inc., OMRON Corporation, Nikon Corporation, SEC Co., Ltd, Shenzhen Zhuomao Technology Co.,Ltd., Scienscope International, Shimadzu Corporation, etc.

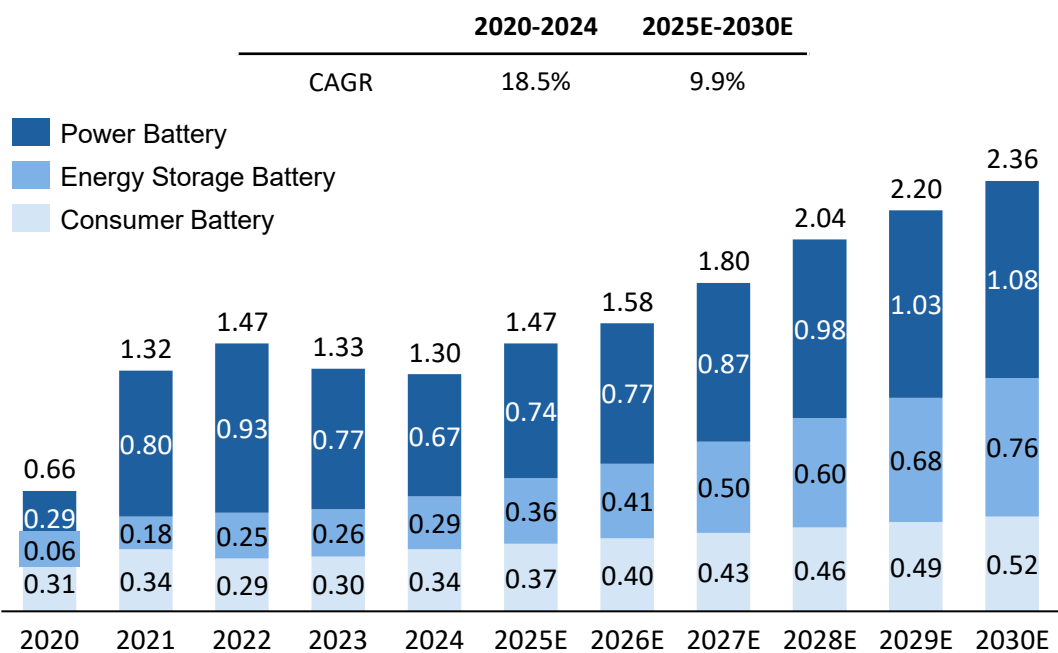
China's leading position in the global power battery and energy storage battery sectors has further driven the technological development and industrial application of X-Ray inspection equipment in the new energy battery field.

X-Ray inspection equipment is widely used in key processes of new energy battery manufacturing, including electrode coating thickness measurement, internal imaging of winding/stacking structures, and defect identification of battery cell welds. Featuring nondestructive testing, high precision, and a high degree of automation, it effectively improves product consistency and yield. China's leading position in the global power battery and energy storage battery sectors has driven rapid growth in inspection demand related to new energy battery manufacturing, further promoting the technological development and industrial application of X-Ray inspection equipment in this field. In 2024, the market size of X-Ray inspection equipment in China's new energy battery sector reached RMB1.30 billion, with market sizes of RMB0.67 billion, RMB0.29 billion, and RMB0.34 billion respectively in the power battery, energy storage battery, and consumer battery segments.

Market Size of X-Ray Inspection Equipment in Global New Energy Battery Sector, 2020–2030E
Billion RMB



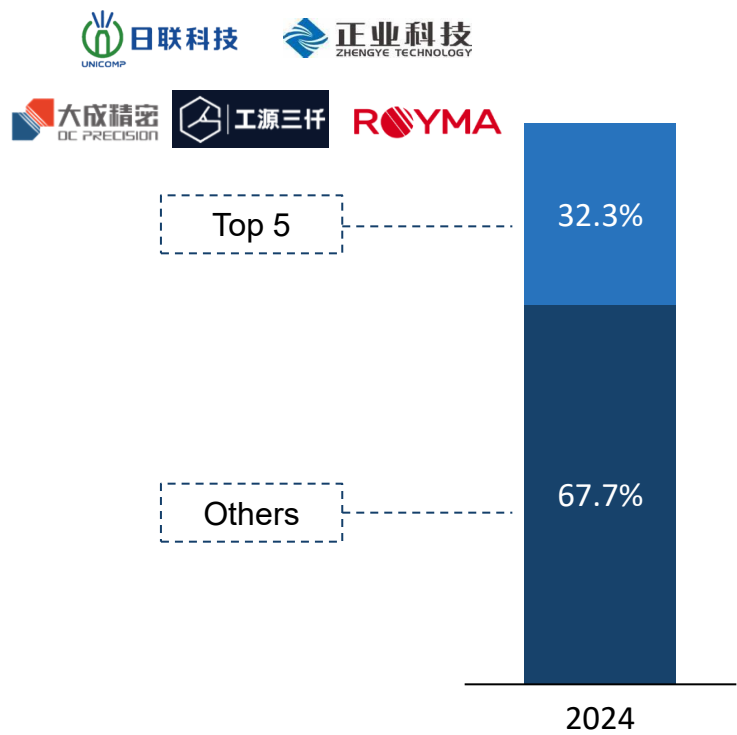
Market Size of X-Ray Inspection Equipment in China's New Energy Battery Sector, 2020–2030E
Billion RMB



The X-Ray inspection equipment market in China's new energy battery sector is dominated by domestic companies. Unicomp, Zhengye Technology, and Dacheng Precision rank in the top tier, each holding a market share of over 5%.

In 2024, China's X-Ray inspection equipment market in the new energy battery sector is dominated by domestic companies, which account for approximately 75% of the total market. In terms of revenue in 2024, Unicomp, Zhengye Technology, and Dacheng Precision rank in the top tier, each with a market share exceeding 5%.

Market Concentration of X-Ray Inspection Equipment in China's New Energy Battery Sector, 2024
Market Concentration by Annual Revenue



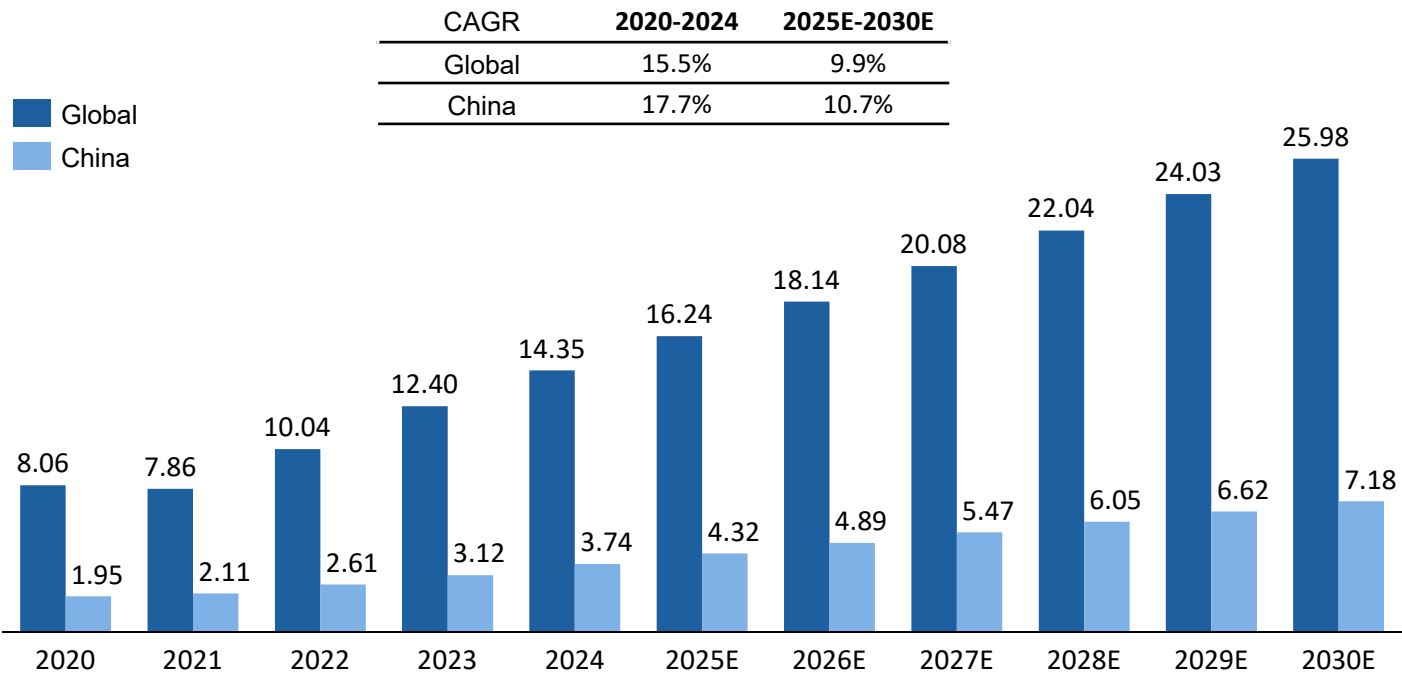
Competitive Landscape of X-Ray Inspection Equipment in China's New Energy Battery Sector, 2024
Market Share by Annual Revenue

Market Share	Company Name	Company Introduction
>5%	Unicomp Technology (Group) Co., Ltd.	A leading Chinese supplier of industrial X-Ray intelligent inspection equipment and core components, with products and technologies primarily applied in inspection fields such as integrated circuits and electronics manufacturing, new energy batteries, castings and welding. It was founded in 2009 and listed on the SSE in 2023.
	Guangdong Zhengye Technology Co., Ltd.	A provider of intelligent industrial inspection equipment, offering industrial inspection, automation, intelligent manufacturing solutions, and new materials to manufacturers in industries such as PCB, new energy batteries, and flat panel displays. It was founded in 1997 and listed on SZSE in 2014.
	Shenzhen Dacheng Precision Equipment Co., Ltd.	Founded in 2011, it is a solution provider for new energy battery production and measurement equipment, mainly offering intelligent equipment and services including measurement, vacuum drying, and X-Ray imaging inspection.
3%-5%	X3000 Inspection Co., Ltd.	Founded in 2021, it is a company engaged in the R&D, manufacturing, and sales of industrial X-Ray intelligent inspection equipment, with a focus on the interdisciplinary application of X-Ray imaging technology and computer vision technology.
	Royma Tech (Suzhou) Precision Co., Ltd.	Founded in 2017, it is a one-stop provider of industrial quality solutions. Its independently developed X-Ray and high-precision intelligent 3D-CT inspection equipment is widely applied in intelligent manufacturing and high-end manufacturing sectors.
<3%	Others	Wuxi Lead Intelligent Equipment Co., Ltd., Nordson Corporation, Sanying Precision Instruments Co.,Ltd., Super Components Engineering(Dongguan) Ltd., Comet Yxlon, Carl Zeiss AG、Innometry Co., Ltd., Shenzhen Zhuomao Technology Co.,Ltd., etc.

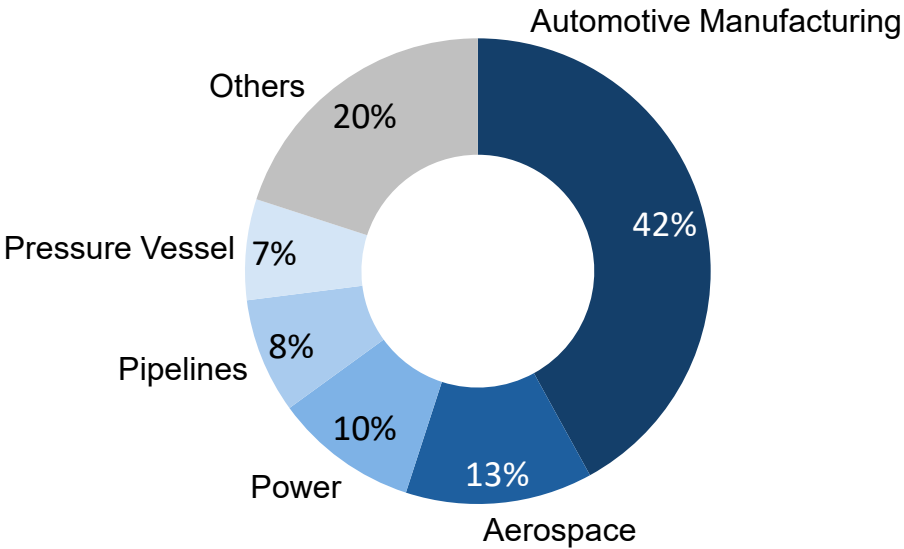
With the continuous improvement of industrial product quality standards and the rapid growth of intelligent manufacturing demand, the application of X-Ray inspection equipment in the field of casting & welding has become increasingly widespread.

With the continuous improvement of industrial product quality standards and the rapid growth in demand for intelligent manufacturing, the application of X-Ray inspection equipment in the field of casting & welding has become increasingly widespread, mainly covering key processes such as internal defect detection, weld quality assessment, and structural integrity analysis. In 2024, the market size of X-Ray inspection equipment in China's casting & welding sector reached RMB3.74 billion, with broad applications in industries such as automotive manufacturing, aerospace, power, pipelines, and pressure vessels. As manufacturing processes in related industries continue to advance and production efficiency improves, the market is expected to further expand. From 2025 to 2030, the market is projected to grow at a CAGR of 10.7%, reaching a market size of RMB7.18 billion by 2030.

Market Size of X-Ray Inspection Equipment in Global and China Casting & Welding Sector, 2020–2030E
Billion RMB



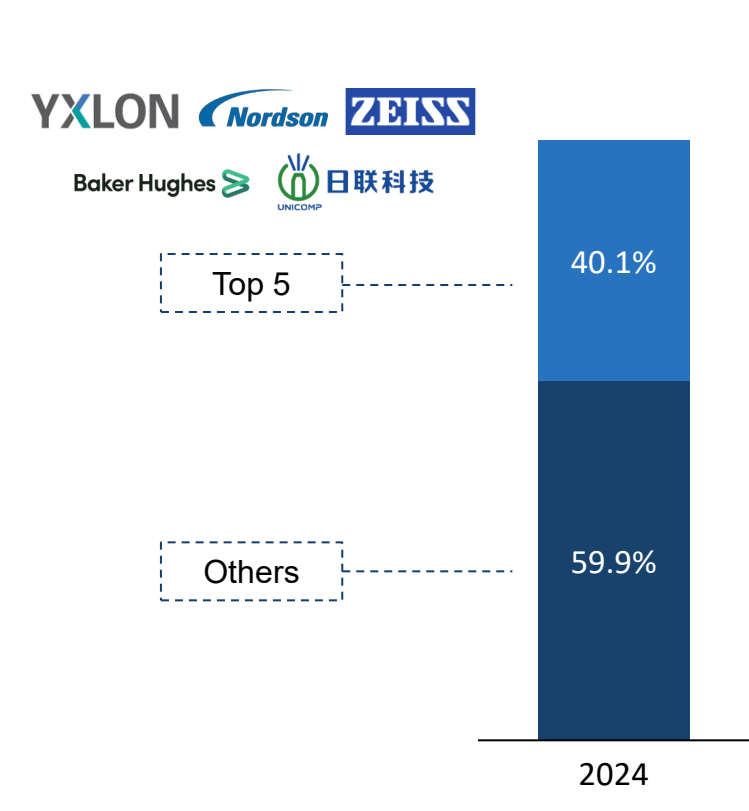
Market Share of Downstream Application Sectors for X-Ray Inspection Equipment in China's Casting & Welding Sector, 2024



In China's X-Ray inspection equipment market for casting & welding , domestic companies account for approximately 28% of the total market. The first tier is mainly composed of overseas companies, while Chinese companies such as Unicom, Aolong Radiative, and Dandong Huari represent the second tier.

In terms of revenue in 2024, China's X-Ray inspection equipment market for the casting & welding sector is highly concentrated, with the top five manufacturers accounting for a combined market share of 40.1%. Chinese companies hold an overall market share of approximately 28%. Leading domestic players, including Unicom, Aolong Radiative, and Dandong Huari, rank in the second tier of the market, each with a market share between 3% and 5%.

Market Concentration of X-Ray Inspection Equipment in China's Casting & Welding Sector, 2024
Market Concentration by Annual Revenue



Competitive Landscape of X-Ray Inspection Equipment in China's Casting & Welding Sector, 2024
Market Share by Annual Revenue

Market Share	Company Name	Company Introduction
>5%	Comet Yxlon	Founded in 1998, it is a globally leading manufacturer of industrial X-Ray and CT system solutions, with products primarily used in the aerospace, automotive, and electronics industries. A global leading provider of precision technology solutions, offering innovative equipment, systems, and services to multiple industries. It was founded in 1954 and listed on NASDAQ in 1979.
	Nordson Corporation	Founded in 1846, it is a globally leading German company specializing in the manufacturing of optical and optoelectronic equipment, focused on the development, production, and sales of measurement technology, microscopes, medical technology, eyeglass lenses, and semiconductor manufacturing equipment.
	Carl Zeiss AG	A global leading energy technology company, whose industrial nondestructive testing business is managed by its subsidiary Waygate Technologies, offering solutions such as X-Ray inspection, industrial CT, visual inspection, and industrial ultrasonic testing. It was founded in 1987 and listed on NASDAQ in 2021.
	Baker Hughes	A leading Chinese supplier of industrial X-Ray intelligent inspection equipment and core components, with products and technologies primarily applied in inspection fields such as integrated circuits and electronics manufacturing, new energy batteries, castings and welding. It was founded in 2009 and listed on the SSE in 2023.
	Unicom Technology (Group) Co., Ltd.	Founded in 2003, it is a developer and manufacturer of X-Ray instruments and material testing equipment, as well as a provider of X-Ray inspection solutions.
3%-5%	Dandong Aolong Radiative Instrument Co., Ltd.	Founded in 1995, it is a provider of X-Ray nondestructive testing solutions, a manufacturer of complete X-Ray nondestructive testing equipment and systems, and a public service provider of 3D imaging inspection.
	Dandong Huari Science Electric Co., Ltd.	Raysov Instrument Co., Ltd., Sanying Precision Instruments Co.,Ltd., VJ Technologies, Royma Tech (Suzhou) Precision Co., Ltd., Aoying Testing Technology (Shanghai) Co., Ltd., etc.
	Others	
<3%		



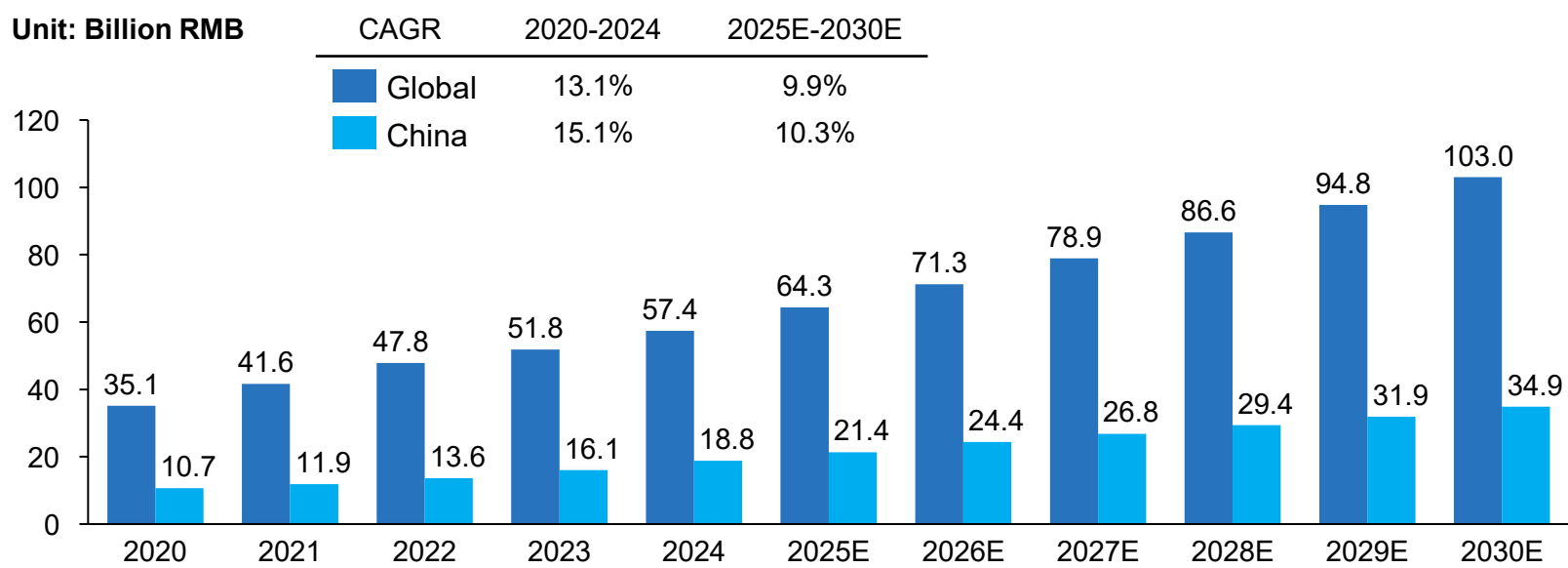
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3 Appendix

The global and Chinese industrial X-ray inspection equipment markets have experienced significant growth over the past five years, with a projected 10% CAGR for the next five-year period. UNICOMP is leveraging R&D and global expansion to shift from China dominance to global industry leader

Industrial X-Ray Inspection Equipment Market Size, 2020–2030E



Key Insights

- Over the past five years, both the global and China's industrial X-Ray inspection equipment markets achieved remarkable growth, driven by robust downstream demand across semiconductor, electronics manufacturing, new energy batteries, casting & welding, food & beverage inspection, and security inspection. China now accounts for approximately 30% of the global market. Looking ahead, propelled by industrial upgrading and technological innovation, the global and China's markets are projected to maintain a ~10% CAGR over the next five years.
- The competitive landscape features established overseas leaders, including COMET, ZEISS, GE (Baker Hughes), Nordson, and ViTrox, leveraging technological expertise and brand strength. **Concurrently**, Chinese players, including UNICOMP, Aolong Radiotive, Dandong Huari, Sanying Precision, Zhengye Technology, and Meiya Optoelectronic are gaining ground through accelerated innovation. **Notably**, UNICOMP has consolidated its domestic leadership and exhibits potential to ascend as a global leader via strengthened independent R&D and global strategic expansion.

Leading Companies in Industrial X-Ray Inspection Equipment Market

Overseas Leading Companies

Baker Hughes

Nordson

comet x-ray

ZEISS

SEC e-beam pioneer

SHIMADZU Excellence in Science

Anritsu

OMRON AUTOMATION

ViTrox

Chinese Leading Companies

UNICOMP 日联科技

Aolong Radiotive 奥龙射线

SANYING

ZHENGYE TECHNOLOGY 正业科技

DANDONG HUARI SCIENCE ELECTRIC CO., LTD 丹东华日理学电气有限公司

NUCTECH 威视

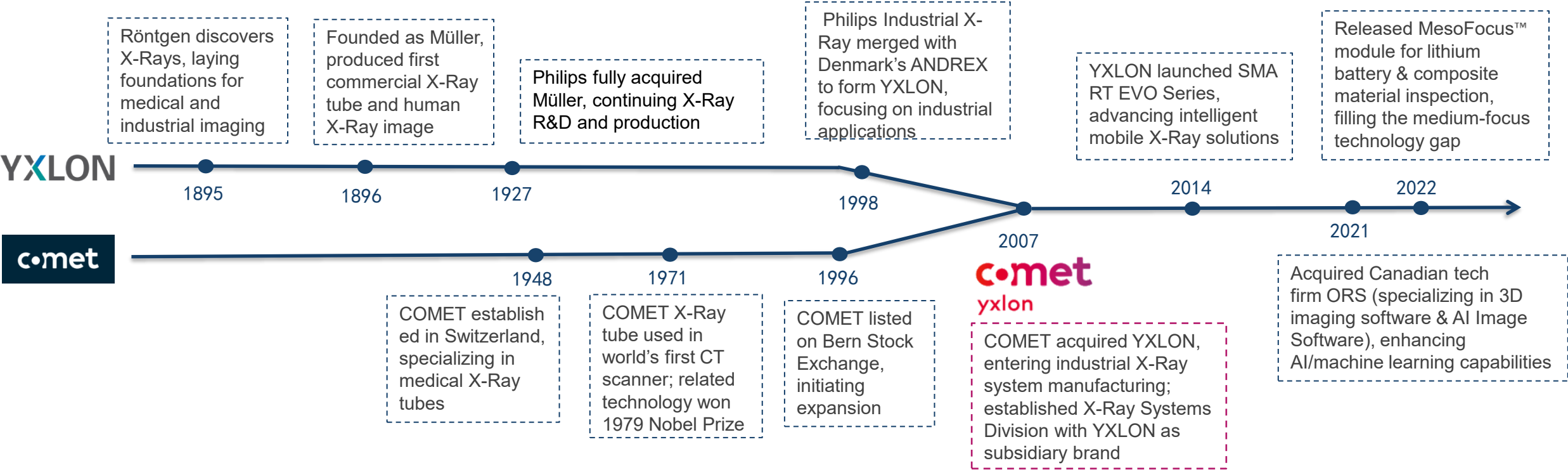
MEYER 美亚光电

ANMIN 安民

TECHIK 太易

COMET, with its business spanning X-Ray tubes, X-Ray inspection equipment, and system integration, consolidates its position as a global X-Ray technology leader after acquiring premium industrial X-Ray inspection equipment manufacturer YXLON in 2007

- As a key global player in X-Ray inspection equipment, COMET Group (founded 1948, Switzerland) has focused on **R&D and manufacturing of high-end RF power systems, X-Ray technologies, and electron beam systems**. Its technologies serve high-precision sectors including **semiconductor manufacturing, security inspection, and medical imaging**. To expand its global footprint in industrial X-Ray inspection, **COMET acquired Hamburg-based YXLON in 2007**.
- YXLON leverages a century-long legacy and leading X-Ray/3D inspection technologies, with applications in automotive, electronics, and aerospace. Renowned for high image resolution and precision, **its integration with COMET's core component expertise created an end-to-end technology chain—from key devices to full systems—in the global NDT market**. Today, COMET advances X-Ray inspection through intelligent, digital, and miniaturized solutions, spearheading NDT innovation.



COMET focuses on two core product lines: high-performance X-Ray tubes and inspection equipment, which are widely applied in semiconductor, electronics manufacturing, casting & welding, and scientific research (1/2)

- As a global leader in industrial X-Ray inspection, **COMET pioneered the world's first 600kV metal-ceramic X-Ray tube, overcoming critical challenges in high-voltage insulation, material penetration, and high-resolution imaging.** Its X-Ray inspection systems cover 20–600kV energy ranges, equipped with advanced detectors and intelligent AI image software, supporting 2D/3D/CT imaging and tomographic scanning. **These systems enable efficient NDT for applications from nano/micro-scale chips to large engines,** empowering manufacturers to achieve reliable quality control and process optimization.

■ X-Ray Tubes

FYNE Nanofocus X-Ray Tube



■ Nanoscale Imaging Capability

Utilizes ultra-high image advanced nano-focus technology for unprecedented resolution, detecting minute structures and defects.

■ High-Precision Applications

Designed for extreme precision demands in semiconductor, electronics, and advanced materials, ensuring clear imaging details.

Xplorer Series X-Ray Tube



■ Sealed Design for Maintenance-Free Operation

Sealed X-Ray tube structure extends lifespan, reduces maintenance, and ensures stable inspection processes.

■ High-Resolution Imaging Precision

Symmetrical focal spot and uniform intensity distribution deliver consistent image quality, enhancing defect detection accuracy.



Product Positioning:

- A new benchmark in ultra-high-resolution X-Ray technology, representing COMET's breakthrough in nanoscale imaging;
- A critical inspection platform for frontier industries (e.g., semiconductor, electronics, advanced materials), meeting future precision requirements.



Product Positioning:

- A core product line of COMET's high-resolution NDT solutions;
- Market leader in high-precision electronics inspection;
- Cost-effective industrial inspection solution.



Applications

- Semiconductor manufacturing & advanced packaging inspection (sub-micron defect detection);
- Precision NDT for high-density electronics and micro-components;
- Structural R&D of advanced materials (scientific research & high-end manufacturing).



Applications

- Quality control for micro-components and complex structures;
- Cost-sensitive production lines requiring efficiency and stability;
- Electronics inspection tasks demanding exceptional image quality.

COMET focuses on two core product lines: high-performance X-Ray tubes and inspection equipment, which are widely applied in semiconductor, electronics manufacturing, casting & welding, and scientific research (2/2)

■ Inspection Systems

CA20 Automated 3D X-Ray Inspection System



■ High-Resolution 3D Imaging Technology

Utilizes sub-micron imaging technology with high-quality image output to precisely capture micro-defects in advanced packaging structures.

■ Full Automation

Fully automated operation seamlessly integrates into wafer fab production and data flow systems, enabling closed-loop management from inspection to feedback.

■ Real-Time 3D Metrology Feedback

Rapid 3D imaging and real-time metrology capabilities for accurate measurement of key solder metrics and complex defect identification.

■ AI-Driven Data Analysis

Integrated automatic defect recognition and advanced AI algorithms for rapid systemic issue localization and trend prediction.

FF85 CT Component Inspection System



■ Dual-Tube Penetration Enhancement

Dual X-Ray tubes cover inspection needs from micro-components to high-density/large structures.

■ High-Speed Reconstruction & Image Optimization

Helical CT and dual helical trajectories with image optimization algorithms enable rapid high-quality 3D scanning.

■ Multi-Axis Stable Platform

7-axis precision motion system with granite base, flat panel detector, and modular array detectors for versatile high-precision inspection.

■ Intuitive Operation Platform

Geminy UI with graphical workflow guidance and automated control, supporting rapid switching between 2D, cone-beam CT, and fan-beam CT modes.



Product Positioning:

- Cutting-edge solution for advanced packaging inspection, tailored for semiconductor packaging.
- Highly automated AI-integrated innovation supporting mass production and fast time-to-market.



Product Positioning:

- Flagship industrial CT solution for large complex components.
- Addresses quality control in new energy vehicles and battery systems.
- Combines high-energy, high-definition, speed, and automation as an industry benchmark.



Applications:

- Wafer fabs and OSAT facilities in semiconductor industry.
- Online defect detection and yield optimization.
- Real-time visual feedback for accelerated process validation.



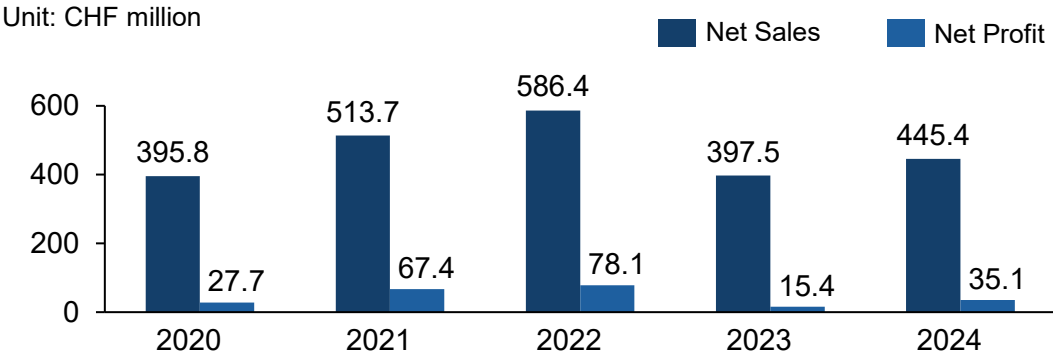
Applications:

- NDT of metal components, battery systems, etc.
- Quality control from R&D/ first-article inspection to small-batch production.
- Failure analysis, 3D digitization, and complex assembly inspection.

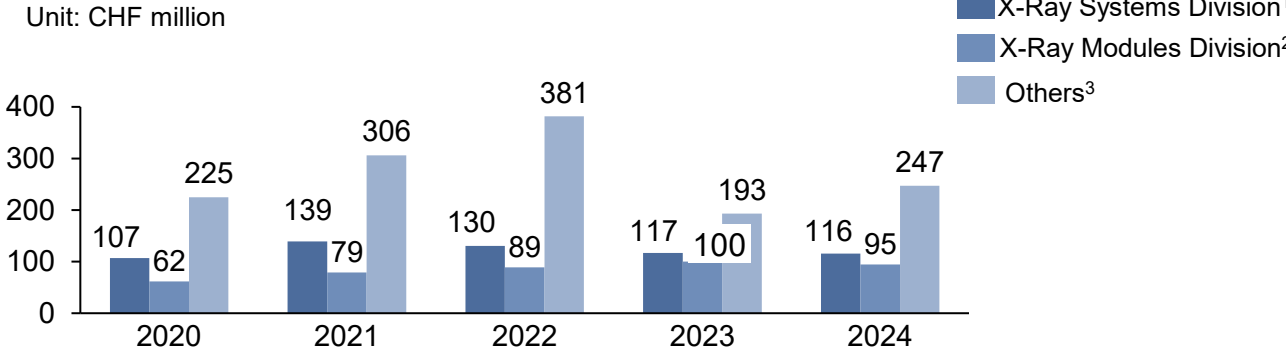
Amid rising global demand for high-precision X-Ray inspection equipment, COMET’s financial performance in 2024 shows marked improvement

- **X-Ray Product Financial Performance:** COMET’s X-Ray tube and portable X-Ray module business (X-Ray Modules Division) maintained an ~11% CAGR over the past five years, demonstrating robust growth. However, 2024 saw a 5% decline due to shifting downstream demand and intensified competition. X-Ray inspection systems (X-Ray Systems Division) sales declined for three consecutive years since 2021, reflecting competitive market pressures.
- COMET’s total net sales dropped significantly in 2023, primarily driven by a sharp revenue fall in its core Plasma Control Technologies (PCT) Division amid the semiconductor industry’s cyclical downturn.

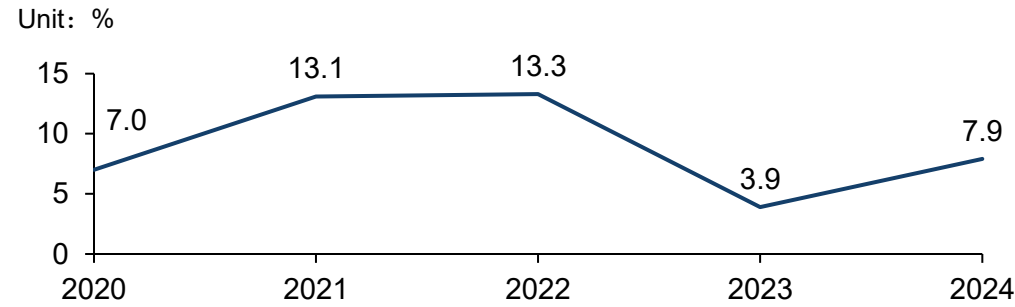
COMET Net Sales and Net Profit, 2020–2024



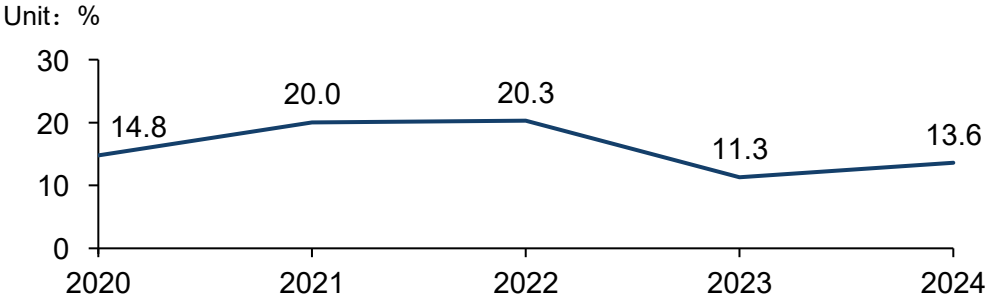
Division Net Sales Breakdown, 2020–2024



COMET Net Profit Margin, 2020–2024



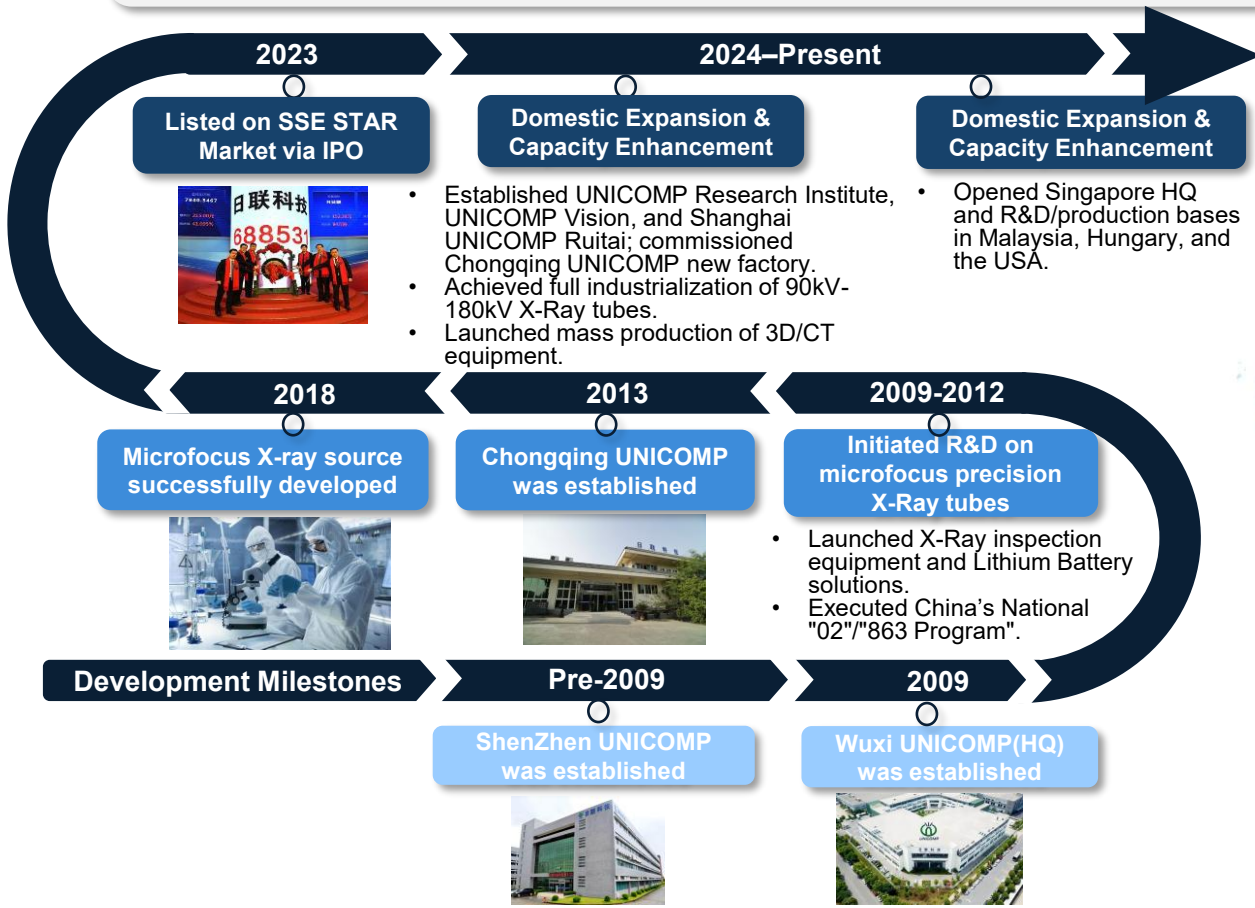
COMET EBITDA Margin, 2020–2024



Notes: 1.X-Ray Systems Division (COMET Yxlon): Develops/manufactures X-Ray inspection equipment and CT systems. 2.X-Ray Modules Division: Produces compact X-Ray Tubes and portable X-Ray modules. 3.Others: Primarily the Plasma Control Technologies (PCT) Division (RF power supply systems). 4.Division sales sum exceeds group total due to elimination of internal transactions upon consolidation.

UNICOMP has achieved significant milestones in X-Ray intelligent inspection equipment through continuous innovation and global expansion, successfully listing on the STAR Market in 2023

- Founded in 2009 and listed on the Shanghai Stock Exchange (SSE) STAR Market in 2023, UNICOMP is a high-tech enterprise specializing in X-Ray technology R&D and X-Ray intelligent inspection equipment manufacturing. As China's earliest integrated solution provider applying AI to X-Ray inspection systems, it is now the largest industrial X-Ray company domestically.
- The company has pioneered China's first sealed hot-cathode microfocus X-Ray tube, filling a critical domestic gap and breaking foreign monopolies. Its products serve semiconductor, electronics manufacturing, new energy batteries, casting & welding, food & beverage inspection, and other fields, **exporting to 70+ countries/regions**. With three major manufacturing bases in China, UNICOMP **accelerates global deployment via its Singapore HQ and R&D/production facilities in Malaysia, Hungary, and the USA**.



UNICOMP specializes in R&D and manufacturing of X-Ray intelligent inspection equipment and core components, serving global leaders across high-tech sectors through full-chain technological innovation

- The company focuses on “**industrial X-Ray intelligent inspection equipment and core components**”, with deep expertise in: semiconductor & electronics manufacturing, new energy batteries, food & beverage inspection. The company's core products include **X-Ray tubes**、**AI image software**、**industrial X-Ray intelligent inspection equipment** (with microfocus X-Ray tubes and imaging software serving as core components, enabling full-chain technology integration for X-Ray inspection) enabling X-Ray inspection solutions for high-precision applications like semiconductor packaging, battery production, and automotive manufacturing, serving industry leaders including BYD, CATL, Luxshare Precision, and SMIC.

UNICOMP X-Ray Intelligent Inspection Solutions

X-Ray Tube Design & Manufacturing

Stable High-Efficiency X-Ray Imaging System

High-Speed Online X-Ray Image Localization and Capture

Lithium Battery Inline X-Ray Inspection System Design

Real-Time Deep Processing for X-Ray Digital Imaging

AI Recognition of X-Ray Image Features

Intelligent Internal Defect Detection for X-Ray Digital Imaging

Microfocus X-Ray CT Tomographic Scanning & 3D Reconstruction Technology

X-Ray Tubes



160kV/1µm Open Tube Microfocus X-Ray Tube



90/110/120/130/150/180kV Microfocus X-Ray Tubes



High-power Small-focus X-Ray Tubes

Inspection Software

3D/CT

3D/CT Inspection

IC

Integrated Circuit Inspection

SMT

Electronics Manufacturing Inspection

LiB

New Energy Battery Inspection

NDT

Industrial Casting & Welding Inspection

FOD

Food & Beverage Inspection

Inspection Equipment



Electronics manufacturing 3D Online Inspection



Semiconductor Microfocus X-Ray Inspection



UNS Series X-Ray Real-Time Imaging System



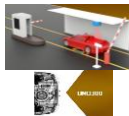
Button Battery Online Inspection



Smart Material Counting System



Bottled Food X-Ray Inspection



Security inspection Underground Garages Inspection System

Semiconductor & Electronics

PCBA manufacturing, chip fabrication, integrated circuit production

New Energy Batteries

Energy storage batteries, power stacked batteries, power wound batteries, consumer electronics batteries

Industrial NDT

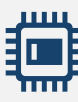
Automotive, aerospace, pressure vessels, material testing

Others

Food & beverage inspection, pharmaceutical inspection, rapid vehicle inspection systems, postal/parcel inspection

Customer Cases

Semiconductor & electronics manufacturing



SAMSUNG infineon FOXCONN SONY BYD LuXshare 立訊精密工業 HUAWEI TCL SMIC

New energy batteries



CATL 宁德时代 SUNWODA 欣旺达 EVE 亿纬锂能 LISHEN BYD

Industrial NDT



Audi MI BYD TESLA BMW BOSCH Panasonic 松下电器 PHILIPS ABB Hisense DEC 东方电气

Food foreign material detection



中粮 COFCO 三只松鼠 Three Squirrels Nestlé 雀巢 海天 乌江 中国好味道 得咭

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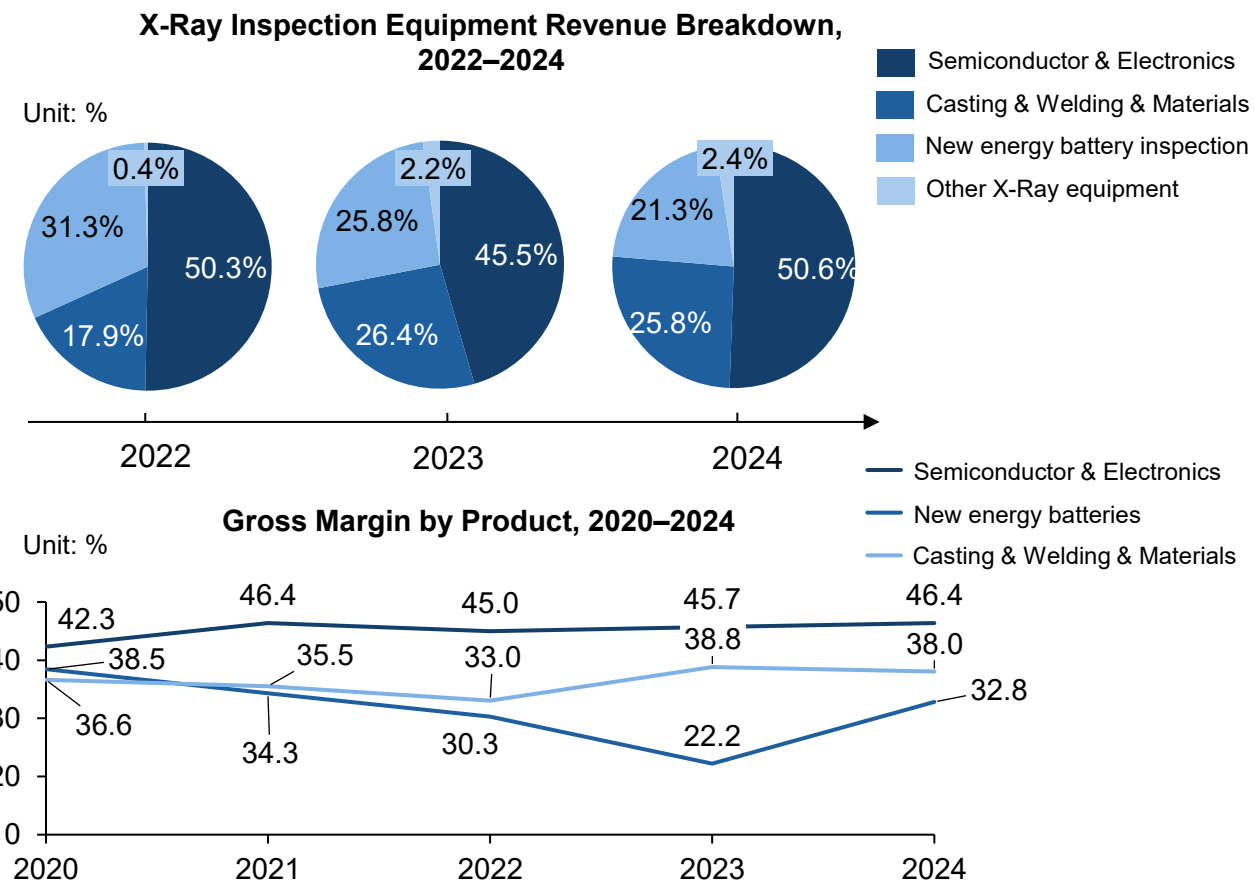
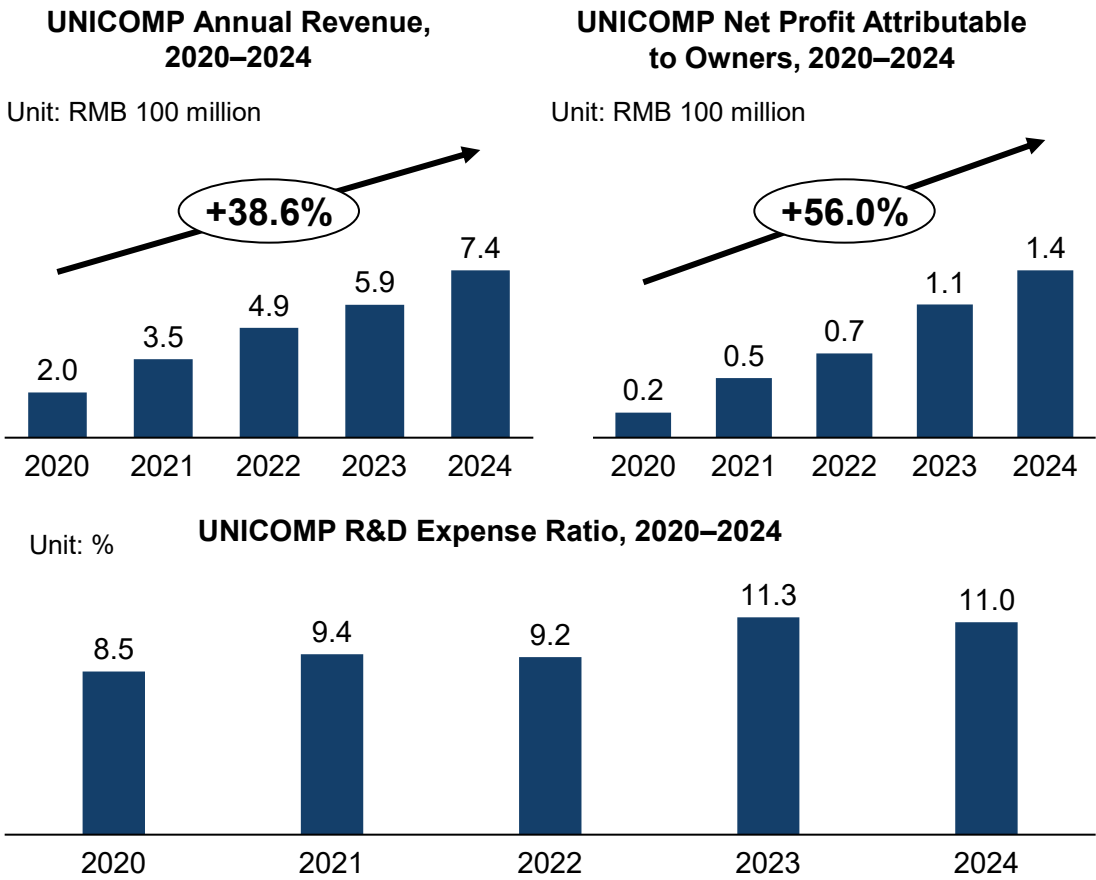
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FROST & SULLIVAN
沙利文

Source: Public information, UNICOMP website, Frost & Sullivan

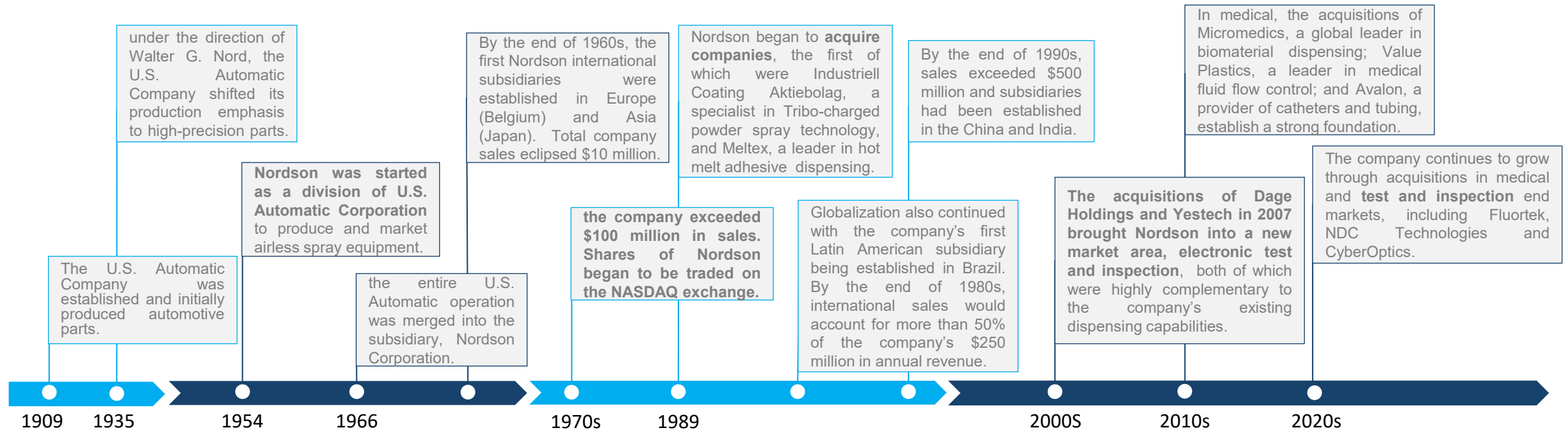
UNICOMP has driven sustained revenue and profit growth while maintaining high product margins through continuous R&D investment and a strategic shift toward premium products

- **Consistent Growth:** Revenue and net profit grew steadily over the past five years, with both achieving a CAGR exceeding 35%. In 2024, net profit increased by 25.44% year-over-year..
- **Premiumization Success:** X-Ray inspection equipment accounted for 88.9% of 2024 revenue. Within this segment, semiconductor & electronics manufacturing segment represented 50.6% of equipment revenue with 46.4% gross margin.
- **R&D Leadership:** R&D expense ratio rose steadily from 8.5% (2020) to 11.0% (2024), with all R&D expenses being fully expensed. In 2024, the company achieved an overall gross margin of 43.7%.



Nordson is a global provider of innovative precision technology solutions for offline X-ray inspection systems, fully automated X-ray inspection systems, X-ray component counting systems, and X-ray technology components

- Nordson was founded in 1954 and is headquartered in Westlake, Ohio, has operating and support offices in more than 35 countries and regions. The company comprises three global operating segments: Advanced Technology Solutions Segment (ATS), Medical and Fluid Solutions Segment (MFS) and Industrial Precision Solutions Segment (IPS). Among these, the **Test & Inspection** division under ATS provides customers with products such as acoustic, optical, bond test, **X-ray components, manual X-ray, automated X-ray systems, and X-ray technology components, etc.** Since its establishment, Nordson has continuously developed in the coating industry, subsequently achieving technological upgrades and business growth through globalization and strategic acquisitions, while enhancing its powder coating and dispensing capabilities. In 2007, with the acquisitions of **Dage Holdings (Dage)** and **YESTech**, Nordson officially entered the new market of electronic testing and inspection. Dage provides high-precision benchtop X-ray inspection systems and X-ray component counting systems, while YESTech specializes in worldwide linear scan automated X-ray inspection (AXI).



Nordson Test & Inspection: Five X-ray product lines with compatible software covering automated and manual systems for SMT and full-spectrum semiconductor applications (1/3)

- Nordson's Test & Inspection division provides X-ray-based equipment, with its five product series comprising: Automated X-ray Inspection (AXI), Manual X-ray Inspection (MXI), Automated X-ray Metrology (AXM), X-ray Component Counting (CC), and X-ray Technologies (XT). These solutions are widely used in advanced SMT, advanced packaging, mid-end semiconductor, and back-end semiconductor applications.

X-ray Inspection and Metrology Equipment

Automated X-ray Inspection (AXI)



AXI XS Series

Ultra-High Resolution Inline Automated 3D X-ray Inspection System Platform

- Automatic barcode read and inspection selection
- Full traceability via MES and SECS/GEM interfaces
- IPC-CFX-2591, IPC-Hermes 9852 and Industry 4.0 read



AXI X# Series

Flexible Inline or Island Automated X-ray System Platform

- Low dose radiation filters for dose sensitive devices
- Automatic barcode read and inspection selection
- Full traceability via MES and SECS/GEM interfaces
- IPC-CFX-2591, IPC-Hermes-9852 and Industry 4.0 ready



AXI X Series

High-Speed Inline Automated X-ray System Platform Dedicated for SMT

- Hardware setup dedicated to PCB inspection
- High Speed setup for In-line pass through configuration
- High oblique angle
- Full traceability via MES and SECS/GEM interfaces
- IPC-CFX-2591, IPC-Hermes-9852 and Industry 4.0 ready

Manual X-ray Inspection (MXI)



Quadra™ Pro Series

Manual 3D/2D X-ray Inspection System Platform for Back-End Semiconductor Applications

- Equipped with the latest Dual Mode Quadra NT4® tube, offers brightness and resolution modes
- Equipped with Revolution™ software, it enables efficient analysis and interpretation of inspection data



MXI Jade Plus

Manual X-ray inspection system platform for electronic assembly

- Spot quality process trends early using advanced measurement tools for distance measurement and voiding
- Ensure IPC-A-610 and IPC-7095 compliance with built in checking for BGA and QFN voiding, solder ball diameter, roundness, bridge and missing
- See assembly defects clearly with 0.95 µm image resolution



MXI Ruby XL

Manual X-ray inspection system platform designed for large circuit boards

- Maintenance-free, sealed-transmissive X-ray tube
- 0.5 µm feature recognition
- Up to 20W target power
- 3 Mpixel @ 25fps Long Lifetime CMOS Flat Panel

Nordson Test & Inspection: Five X-ray product lines with compatible software covering automated and manual systems for SMT and full-spectrum semiconductor applications (2/3)

- Nordson's Test & Inspection division provides X-ray-based equipment, with its five-product series comprising: Automated X-ray Inspection (AXI), Manual X-ray Inspection (MXI), Automated X-ray Metrology (AXM), X-ray Component Counting (CC), and X-ray Technologies (XT). These solutions are widely used in advanced SMT, advanced packaging, mid-end semiconductor, and back-end semiconductor applications.

X-ray Inspection and Metrology Equipment

Automated X-ray Metrology (AXM)

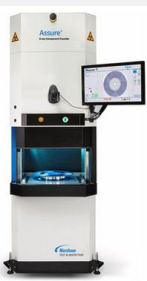


AXM Nordson
XM8000™

Wafer X-ray Metrology Platform

- Suitable for advanced semiconductor packaging and CoWoS (Chip-on-Wafer-on-Substrate, a 2.5D advanced packaging technology from TSMC)
- Directly embedded into the integrated circuit manufacturing and packaging process, and also serves as a core link for quality control and final acceptance
- Enables non-destructive wafer-level measurement within the production cycle time for parameters such as voiding rate, fill level, overlay shift, and critical dimensions

X-ray Component Counting (CC)



CC Assure™

X-ray Component Counter equipped for real-time component inventory management

- Simplifies the reel counting workflow by automatically reading the reel's barcode ID with an integrated camera
- The single-count mode features fully automated component recognition, while the group-counting function enables results grouping by part number, unique ID, or order number. The quad-count mode allows simultaneous counting of four reels

X-ray Technology Component

X-ray Technologies (XT)

X-ray Detector



XRT Detector Onyx

- Proprietary 2768 × 2376 active pixel sensor array of 50 × 50 μm pixels
- Consists of a high-speed, low-noise, radiation-tolerant, 14 × 12 cm, 6.6M pixel CMOS image sensor, with a directly deposited high-resolution CsI scintillator on Fibre Optic Plate
- Access through a software interface, connected via a 10 GbE SFP+ hardware interface.

Microfocus X-Ray Tube



XRT Source
Brighthawk

- Consists of a LaB6 crystal source for generation of the electron beam, a magnetic beam steering system, and a tungsten target for X-ray photon emission
- Mounted in a precision-engineering housing and held at ultra-low vacuum levels for long-life performance
- Wide energy range from 30 kV to 160 kV
- Is highly configurable through a software interface to the internal control board, which is connected via an optical interface (through an Ethernet converter)

Nordson Test & Inspection: Five X-ray product lines with compatible software covering automated and manual systems for SMT and full-spectrum semiconductor applications (3/3)

- Nordson Test & Inspection provides software solutions for X-ray equipment. MIPS, DPCT, and SIGHT enhance automated X-ray inspection (AXI) by delivering faster and more efficient image capture, inspection, and statistical process control. Revolution enables high-quality 3D image modeling for manual X-ray inspection (MXI), while Nordson Intelligence utilizes machine learning and artificial intelligence to reduce false calls and improve production efficiency.

X-ray Inspection and Metrology Equipment

Automated X-ray Inspection (AXI)



MIPS Software & Inspection Tools

- Software and inspection tools compatible with AXI equipment
- 16-bit image processing
 - Automatic grey-level and geometric calibration
 - Teach&Go for fast and easy inspection creation
 - Proprietary advanced algorithm library
 - Machine learning based defect classification
 - Multi-layer slice extraction and analysis
 - Software based warpage compensation available



Dynamic Planar CT

- 3D Dynamic Flat Panel CT
- Accelerated Acquisition – >2× faster than Planar CT
 - Enhanced Data Quality – clear layer separation
 - Superior Reconstruction – brand new 3D algorithm
 - Greater UPH – dramatically increased throughput
 - Larger FoV – increased coverage & shorter cycle times
 - Lower Radiation Dosage – reduced time of exposure
 - Reduced Complexity & CoO – no specialized clamping needed

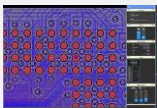


Nordson SIGHT

Statistical Process Control package compatible with AXI equipment

- Analyze with defect data driven statistics & yield monitoring
- Visualize with graphs, charts & CAD defect mapping
- monitor KPIs in real time or over time with trend analysis
- offer extensive range of customized reporting options
- alarms & alerts triggered by definable criteria
- customizable dashboard layout & content
- significantly more drill down functionality than available via MES

Manual X-ray Inspection (MXI)



Nordson Revalution - MXI Software

Complement to Computed Tomography (CT)

- By capturing multiple X-ray images at different angles around an object, a 3D model of the object can be created
- Advanced reconstruction algorithms with intelligent artefact corrections deliver high quality 3D images
- Revealing hidden details, such as voiding or defects, without destroying the object
- Ease of use and fast scan times enable high throughput

AI Solutions Designed for Production



Nordson Intelligence

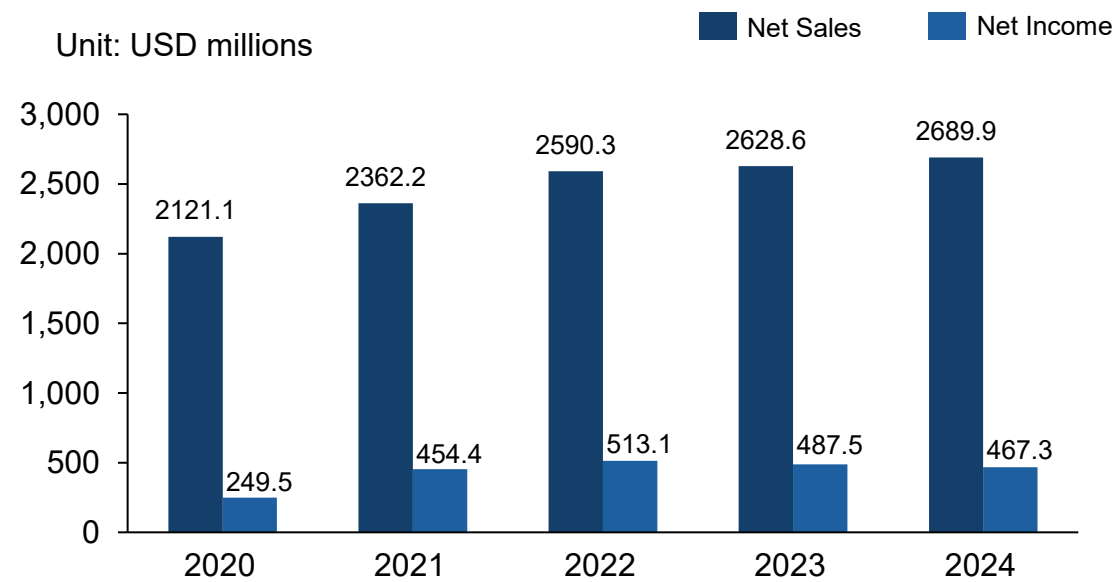
Leveraging machine learning and artificial intelligence to reduce false calls

- Improves efficiency by significantly reducing overkill, thereby decreasing operator workload.
- Higher confidence in defect classification based on statistical probability (quantitative).
- Better consistency by minimizing variations and subjectivity between different operators and production lines.
- Continuous improvement through ongoing refinement of AI models by leveraging accumulated data.

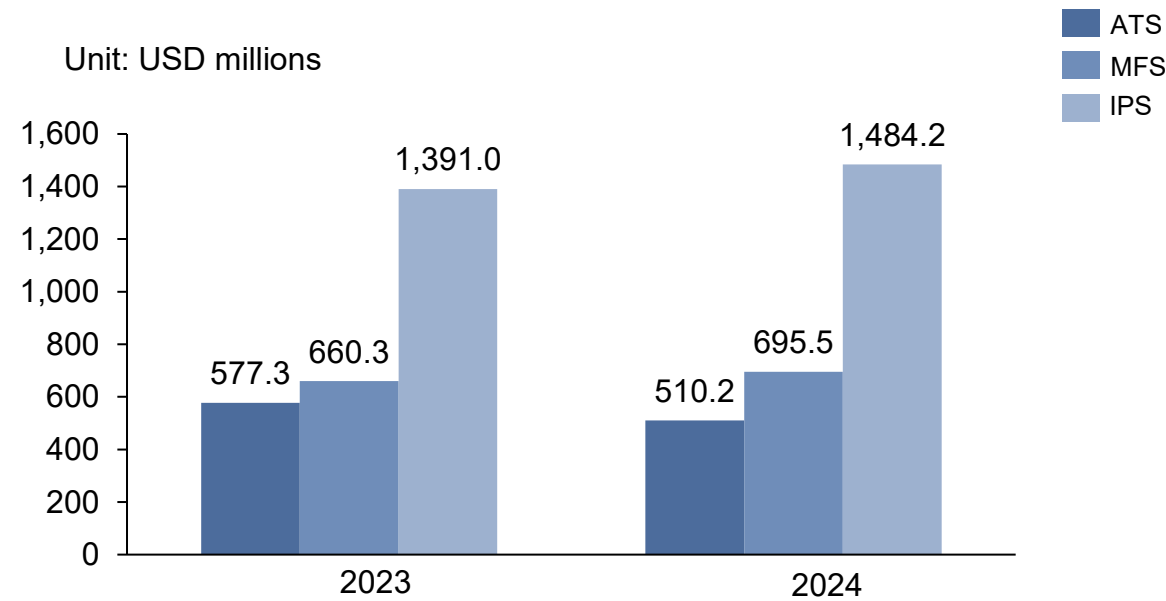
Nordson's overall revenue and profit grew from 2020 to 2024, but the performance of its ATS segment has been cyclical. A recovery in the semiconductor market is expected to be the key driver for this business.

- X-ray inspection systems are widely used across various industries, including semiconductors, electronics assembly, lithium batteries, and packaging. The business development of Nordson's ATS segment is closely linked to the semiconductor inspection and packaging sectors. Although Nordson's overall revenue reached record highs between 2020 and 2024, the performance of its ATS segment, which provides X-ray inspection equipment, has been more cyclical.
- During the 2020-2024 period, Nordson's total net sales demonstrated steady annual growth. Among its various business divisions, the ATS segment consistently represented the smallest proportion of total sales. In 2024, ATS's net sales decreased by 11.6% compared to 2023, primarily due to reduced demand in both the electronic dispensing and test & inspection product lines. This indicates the division's susceptibility to downstream market fluctuations and its dependence on the cyclical patterns of the semiconductor and electronics industries.

Nordson Net Sales and Net Income, 2020-2024¹



Nordson Net Sales by Segment², 2023-2024



Note: 1. The reporting period for the annual report concludes on October 31st each year.; 2. Nordson comprises three global operating segments: Advanced Technology Solutions Segment (ATS), Medical and Fluid Solutions Segment (MFS) and Industrial Precision Solutions Segment (IPS). Within ATS, the Test & Inspection division provides customers with products including acoustic, optical, bond test, X-ray components, manual X-ray, automated X-ray systems, and X-ray technology components, etc.

GE (Baker Hughes) is a leading enterprise in the global industrial Non-Destructive Testing (NDT) field, providing X-ray, ultrasonic testing, and AI-driven full-lifecycle testing solutions.

- GE Inspection Technologies (GEIT), a part of General Electric (GE), was renamed Waygate Technologies in January 2020 after GE divested the majority of its stake in Baker Hughes in 2019. It became a core business unit within Baker Hughes's Industrial & Energy Technology segment. Baker Hughes was one of the first companies in the industry to apply X-ray technology to industrial inspection scenarios.
- In terms of core testing technology layout, Baker Hughes has launched the Krautkrämer automated ultrasonic testing system through its business. With core advantages of high safety, high detection accuracy, and production efficiency guarantee capability, it is widely used in quality control of key assets in multiple industries. For example, for high-pressure transmission pipelines in the oil and gas industry, aircraft wing structures in the aerospace sector, and various core components in metal processing and heavy manufacturing, the Krautkramer system can accurately identify internal or surface defects in assets without interrupting the production process or affecting output. This includes detecting internal impurities and cracks in metal rods and wires, assessing thickness uniformity and delamination in steel and aluminum plates, evaluating weld quality and corrosion in pipes, and identifying internal porosity, shrinkage cavities, and other defects in forgings and castings, providing technical support for customers' safe operation and full lifecycle management.



GE (Baker Hughes) provides advanced NDT equipment and technologies. Its core product series encompass industrial X-ray inspection systems, CT scan inspection systems, remote visual inspection equipment, etc., widely used in the electronics industry, oil and gas, and other fields (1/2)

- GE is a leading enterprise in the global NDT field, possessing numerous leading technologies and products. Its industrial X-ray inspection systems cover types such as microfocus and conventional focus, enabling comprehensive inspection from tiny precision components to large structural parts; CT scan inspection systems include series like high-precision and large-size, **meeting the inspection needs of workpieces with different accuracy and size requirements**. These products are widely used in aerospace, automotive and other industries, **helping enterprises achieve efficient and reliable quality control and process optimization**.

■ Phoenix X-ray CT Solutions for Non-Destructive Testing and Metrology

2D X-ray Detection System (AXI)



Cost-effective NDT X-ray AXI systems

- 160 kV/20 W X-ray tube with unlimited service life, which can even penetrate materials with high absorption rates.
- Improved scintillator technology in the new detector enables higher quality electronic detection
- Comprehensive software package offers a simple, fast tomographic scanning experience



High-resolution systems for radiographic inspection and tomographic scanning

- Long-life flash lifetime extended by up to 10 times, ensuring long-term stability and optimizing system efficiency
- 180 kV/20 W high-power nanofocus X-ray tube and a 240 kV/320 W microfocus X-ray tube
- Fully automated data collection, volume processing, and evaluation can be easily achieved



High-speed automated X-ray system platform dedicated to SMT

- Capable of analyzing different types of components with significant scan time reduction at highest image quality
- enables the inspection of large assemblies with unmatched precision, speed, and user-friendliness
- 9 MeV LINAC source, 20 times more powerful than the optional 450 kV minifocus X-ray tube

3D CT system solutions



Most flexible industrial dual-tube micro/nano CT scanner

- Open directional high-power microfocus X-ray tube with closed cooling water circuit
- 300 kV Microfocus and optional 180 kV Nanofocus X-ray tubes
- Variety of exclusive high performance detectors and proprietary premium CT technologies



Powerful, compact 450 kV Microfocus CT scanner

- Offers industry-leading specimen weight, flexibility and maximum penetration power for highly absorbent parts at 450 kV
- High level of automation minimizes the time and effort required by the operator
- Increased repeatability and reproducibility of CT results



Premium performance nanoCT® scanner

- Realizes a unique spatial and contrast resolution on a wide sample and application range
- Includes all essential features for CT with extremely high accuracy and reproducibility
- Competitive in many synchrotron or intelligent application fields

GE (Baker Hughes) provides advanced NDT equipment and technologies. Its core product series encompass industrial X-ray inspection systems, CT scan inspection systems, remote visual inspection equipment, etc., widely used in the electronics industry, oil and gas, and other fields (2/2)

Non-Destructive Testing Software



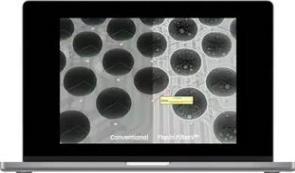
ADR for X-ray and CT



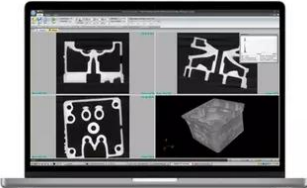
Planar CT



Rhythm Radiography Software Suite



2D X-Ray Inspection Software



Industrial CT Acquisition & Reconstruction Software



Intelligent Image Processing Technology



Product Positioning:

- Connects data and people to deliver smarter inspection results faster—from radiographic testing and data analysis tools to flexible data storage, data management, and real-time collaboration.



Application Fields:

- Widely oriented to industrial manufacturing inspection scenarios, where inspection accuracy and efficiency are crucial. With advanced algorithms and data analysis capabilities, the software can conduct comprehensive and detailed inspections of various industrial products to quickly identify internal or surface defects of products.

Digital X-Ray Detectors (DXR)



High-resolution detector

- 75-micron pixel resolution delivers fine details for critical applications
- Narrow width ideal for situations with limited detector positioning freedom
- Precision imaging that meets the most stringent standards

High contrast DXR detector

- Ideal for corrosion monitoring in the oil & gas and energy industries
- High contrast with 140-micron pixel resolution
- Increased dose sensitivity for shorter exposure times and faster throughput



Product Positioning:

- Digital X-ray Detectors (DXR) are designed for high-productivity, high-quality field radiography testing.
- Provides high-quality and efficient imaging solutions required for industrial on-site testing.



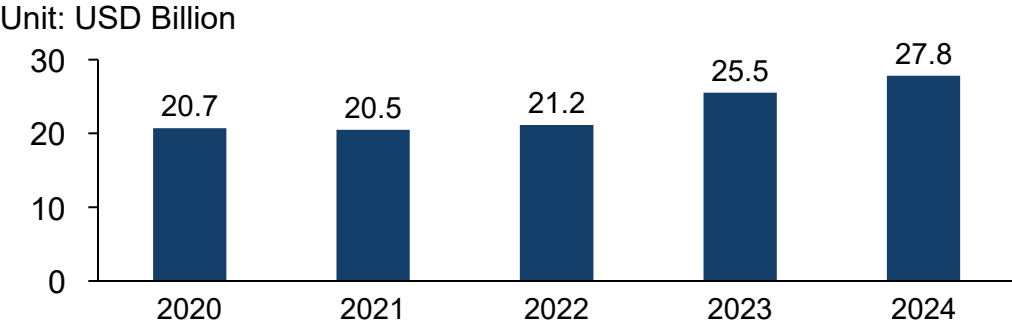
Application Fields:

- Mainly oriented to O&G application scenarios, where speed and radiographic contrast are crucial. The scintillator body used in the detector is optimized for dose conversion efficiency.
- Oriented to high-end inspection applications. Longer exposure times are required but result in superior clarity.

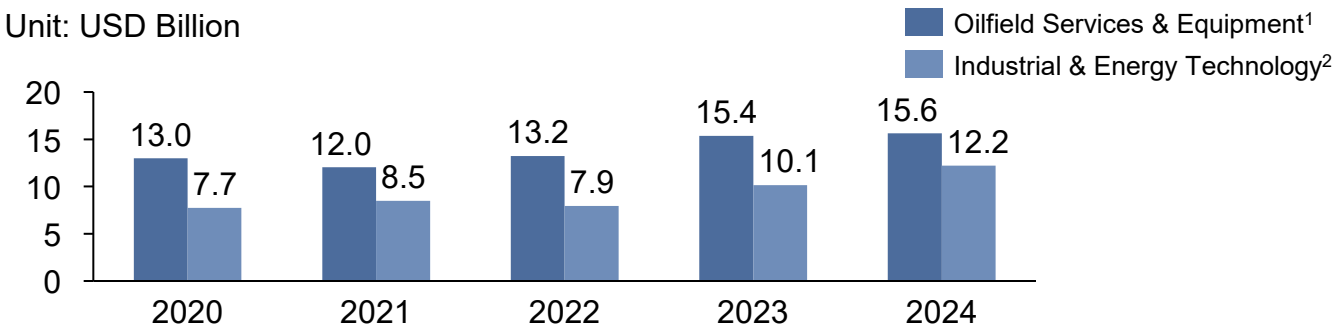
As the global industrial inspection sector continues to see rising demand for high-precision testing technologies, GE (Baker Hughes) has demonstrated strong financial performance in recent years.

- After undergoing structural restructuring, Baker Hughes has actively adjusted its business layout, and both its financial status and business pattern have achieved significant improvement. The total revenue steadily increased from 20.50 billion US dollars in 2020 to 27.83 billion US dollars in 2024, and the net profit margin rose from -1.1% in 2020 to 11.0% in 2024. The profit level has significantly recovered and continued to improve. In terms of business segments, the oilfield services and equipment, and industrial and energy technology businesses have continued to optimize. Baker Hughes has launched advanced equipment and intelligent software covering multiple scenarios such as X-ray inspection and CT scanning based on its technical accumulation in the nondestructive testing field. These accurately meet the high-precision inspection needs of industries such as aerospace and electronics, effectively driving the company's revenue growth.

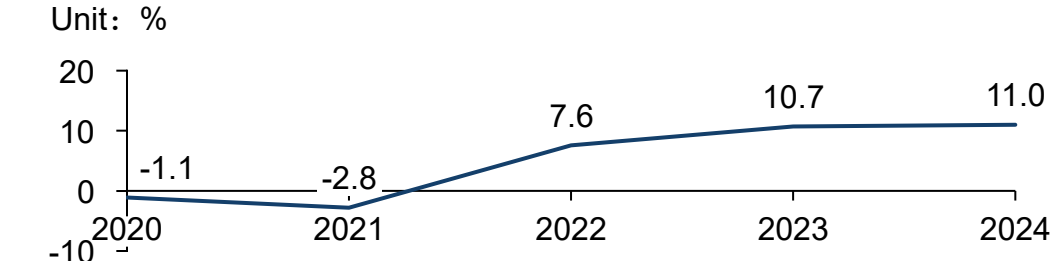
Baker Hughes Total Revenue, 2020-2024



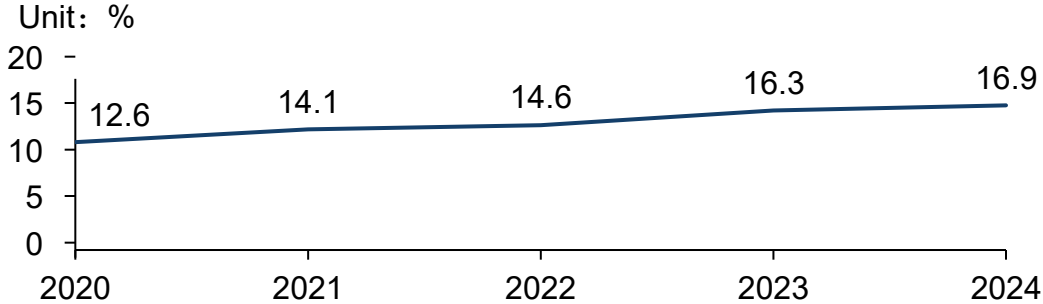
Baker Hughes Revenue by Business Segment, 2020-2024



Baker Hughes Net Profit Margin, 2020-2024



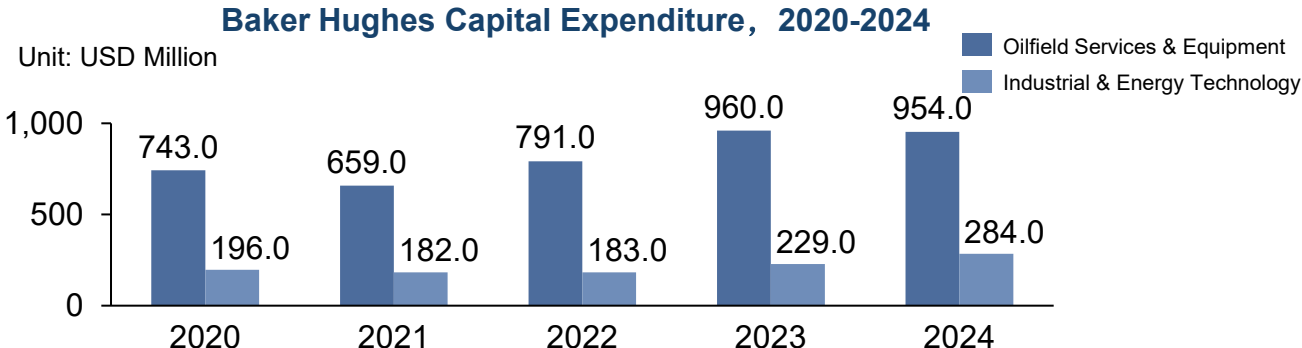
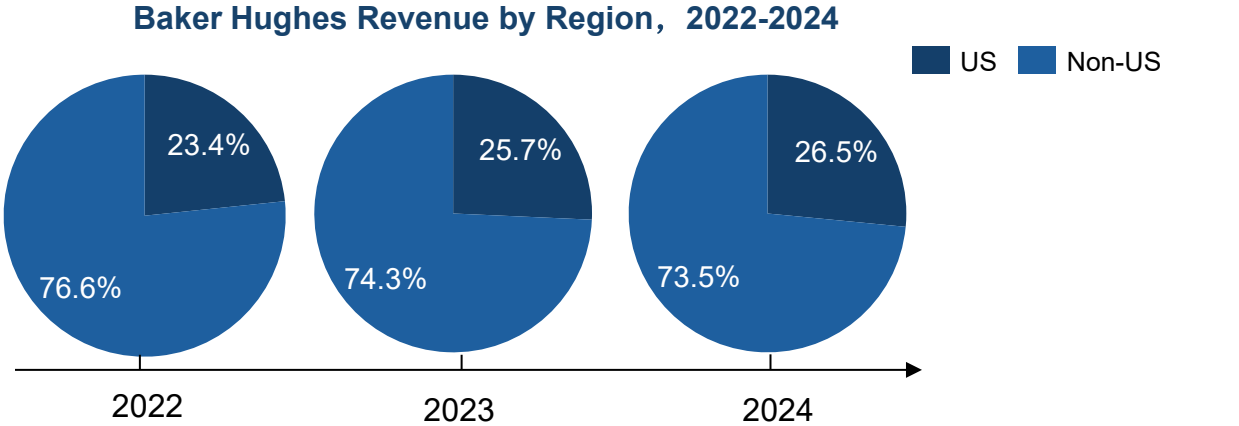
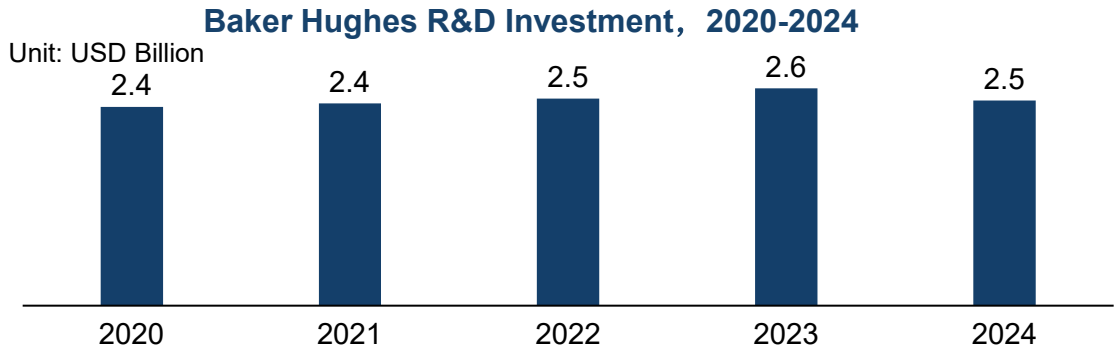
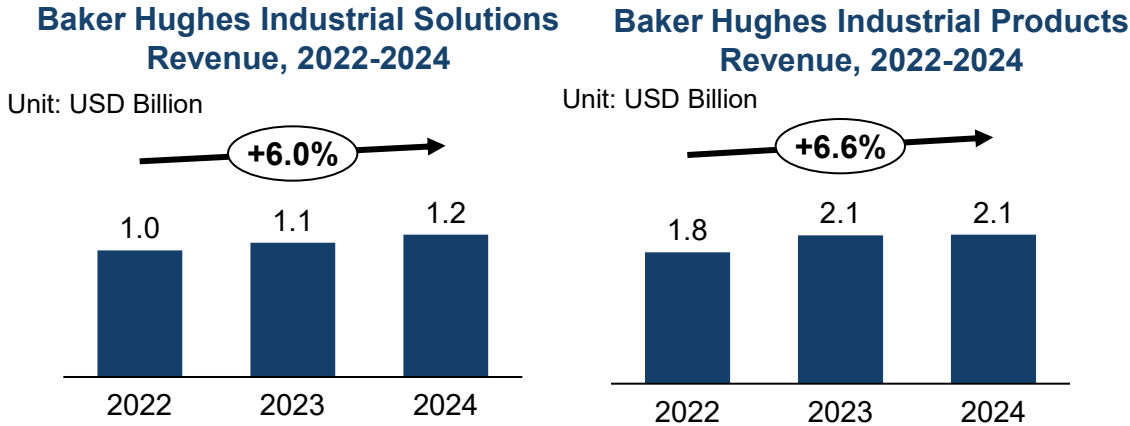
Baker Hughes EBITDA Margin, 2020-2024



Note: 1. Oilfield Services & Equipment: Focuses on providing scientific, integrated, and production-chemical production optimization for global oil and gas industry; 2. Industrial & Energy Technology: Focuses on the R&D and manufacturing of industrial non-destructive testing equipment, low-carbon energy solutions, and related technical services.

By continuously increasing R&D investment, and focusing on the industrial & energy technology sector, GE (Baker Hughes) has driven steady growth in its industry-related business, demonstrating strong operational performance and the effectiveness of its digital transformation.

- **Steady Growth in Industrial Product Revenue:** Industrial non-destructive testing-related businesses are categorized under the Industrial Products revenue segment. This segment maintained growth from 2022 to 2024, with the growth rate reaching 6.5% from 2023 to 2024.
- **R&D Investment and Global Layout:** The company's R&D investment showed an increasing trend over the past five years. Geographically, non-US regions still contribute the majority of revenue; however, as part of a regional strategic shift, the proportion of revenue from the US region has increased year by year.
- **Capital Expenditure:** Among the capital expenditure across business lines, growth in the traditional oil & gas equipment and services segment tends to be stable. The company's strategic focus is shifting towards high value-added areas.



Note: 1. Industrial solutions: Covering fields such as oil and gas, aerospace, and electronics, providing solutions to improve extraction efficiency (such as drilling + monitoring solutions); 2. Industrial products: Including energy development (drilling tools, pressurization equipment, etc.) and industrial testing (X - ray/CT equipment, ultrasonic instruments, etc.) categories.

Source: Public information, Baker Hughes Website, Frost & Sullivan

GE (Baker Hughes), Unicom, and Nordson have become the three enterprises with the widest product coverage by virtue of their full - scenario product layout and full coverage of core technologies. The "GUN trio" all have the comprehensive capabilities to serve high-end manufacturing and pan-industrial fields.

Category	Precision Inspection Equipment		High-penetration inspection equipment	Ordinary inspection equipment
	Open X-Ray Tube	Sealed X-Ray Tube		
Enterprise	HAMAMATSU 	HAMAMATSU 	COMET 	Varian 
	YXLON 	Thermo Fisher 	VJ Technologies 	Mettler Toledo 
	Finetech 	SHIMADZU 	Nordson 	Anritsu Corporation 
	ZEISS 	ZEISS 	UNICOMP 	Thermo Fisher 
	Baker Hughes 	Nordson 	Baker Hughes 	UNICOMP 
	UNICOMP 	UNICOMP 		Baker Hughes 

Analysis of Companies' Market Position

Comprehensive Coverage Leading Enterprises		As the "Pride of China" impacting the global market, it is one of the few emerging Chinese companies to have achieved a full series product matrix coverage, ranging from standard ray sources, closed-tube ray sources, open-tube ray sources, to high-power ray sources.
		Baker Hughes has achieved significant development for its ray source business in the energy and industrial reshaping fields. Its mature technological foundation provides robust support, making it one of the primary players for breakthroughs in the global economic transition.
		A globally leading benchmark manufacturer deeply engaged in precision manufacturing and ultra-precision testing, focusing on the electronics manufacturing and semiconductor packaging sectors, and an important partner for many leading global electronics manufacturers.

Overview of Core Products by Company

Has successfully developed and industrialized high-power 180kV microfocus X-ray sources; based on microfocus X-ray CT tomography 3D reconstruction technology, it has initially achieved import substitution in fields such as electronics manufacturing, new energy batteries, castings, weldments, and material testing.
Its industrial X-ray inspection systems cover types like microfocus and conventional focus, enabling comprehensive inspection from tiny precision components to large structural parts. Its core technological advantage lies in high-precision industrial CT systems.
Its technological path is very clear: primarily using microfocus X-ray sources, with core technology in high-resolution DR imaging, and offering micro-CT adaptation on chips.

GE (Baker Hughes), Unicom, and Nordson hold significant positions due to their technological accumulation. The "GUN trio" represents a select few industrial X-ray inspection companies in the industry with comprehensive cross-sector service capabilities.

Downstream Industry Classification & Representative Companies		
Semiconductor & Electronics Manufacturing		
YXLON GE Nordson ZEISS	SEC SCIENSCOPE SHIMADZU	UNICOMP SYMC Seamark ZM
Lithium Battery		
ZEISS YXLON	UNICOMP DC Precision	ZHENGYE SHUANGYUAN
General Industry		
YXLON ZEISS Nikon VJ Technologies	UNICOMP HUARI	AOLONG FOCUS
Others(such as Food Inspection, Security Inspection)		
Thermo Fisher METTLER TOLEDO Anritsu	UNICOMP MEIYA GAOJING	DOOKOO TECHIK

Notes: 1. YXLON has been acquired by COMET. 2. **Light blue** fonts represent overseas enterprises, and **dark red** fonts represent Chinese enterprises.

Comprehensive Coverage Leading Enterprises



Semiconductor & Electronics manufacturing	
XD7500, XD7600 series imaging systems for dynamic real - time detection	Quadra3 system inspects the quality of semiconductor components and PCBA solder joints



Semiconductor & Electronics manufacturing	
Phoenix Micromex Neo & Nanomeix Neo Semiconductor manufacturing quality control and failure analysis	Phoenix Xlaminer System micro - focus X - ray high - resolution detection



Semiconductor & Electronics manufacturing	
X-Ray 3D online X-ray inspection equipment	IC X-Ray Semiconductor Microfocus X-ray inspection equipment



Semiconductor or	Electronics manufacturing
	Apogee 90 X-ray inspection system for digital automated solder joint inspection of PCB



Semiconductor & Electronics manufacturing	New energy batteries	Industrial NDT	Others
			XR75/XR75e series defect inspection, flaw detection, dimensional inspection and virtual reconstruction inspection
			MS9710 series 3D intelligent security system

New energy batteries

XD7500 series used for electrode coating inspection, pole piece wrinkles

Industrial NDT

XD7600NT high - resolution inspection system for automobile castings, aerospace parts inspection

Others

AXI XS series ultra-high-resolution industrial CT for the internal structure inspection of medical devices

New energy batteries

Phoenix V|tome|x M Neo, Phoenix V|tome|x M300 computer tomography solution, 3D measurement and analysis

Industrial NDT

Phoenix V|tome|x series C450, Powerscan HE automobile castings, aerospace parts inspection equipment

Others

Phoenix Nanotom® M nano - focus X - ray high - resolution imaging detection of tiny foreign matters in food

New energy batteries

New energy battery inspection X - Ray battery and cell inspection equipment

Industrial NDT

Intelligent dot matrix X-ray high-speed counting system

Others

Vehicle safety inspection X - Ray chassis vehicle inspection system

Semiconductor or

Electronics manufacturing

Apogee 90 X-ray inspection system for digital automated solder joint inspection of PCB

Industrial NDT

Inspect 3D X - ray CT system for aircraft engines, automobile engines and other parts

Others

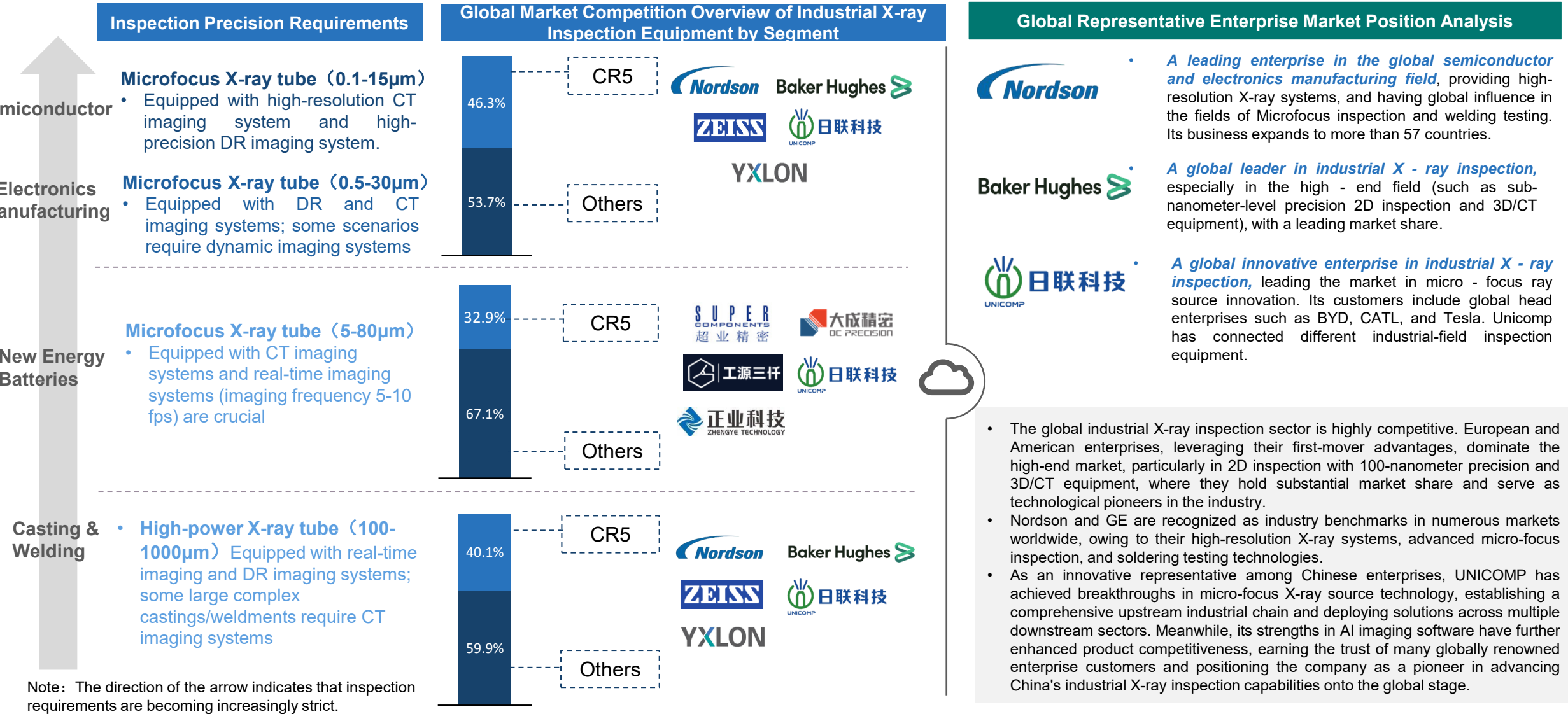
Note:

Blue color blocks represent the layout of corresponding equipment ;

Gray color blocks represent no corresponding equipment layout

- The semiconductor and electronics manufacturing field involves micro and even nano level defect detection, so it has the highest requirements for equipment resolution, imaging speed and stability. Among the world's leading enterprises, European and American enterprises GE (Baker Hughes) and Nordson occupy important positions due to their technological accumulation, while Chinese enterprise UNICOMP is gradually expanding its presence by virtue of independent R&D strength. From the perspective of business segment coverage, due to the significant differences in the requirements for X-ray detection equipment's penetration, resolution and detection efficiency in different detection fields, only a few enterprises can achieve comprehensive coverage. Except for a few overseas leading enterprises, Chinese leading enterprise UNICOMP has products in semiconductor and electronics manufacturing, new energy batteries, food inspection and other fields, becoming one of the few industrial X-ray inspection enterprises in China with comprehensive service capabilities. UNICOMP is growing strongly in the Chinese market and is waiting for opportunities in the overseas market.

In terms of market competitive position, GE (Baker Hughes), Unicom, and Nordson continue to lead the global industrial X-ray inspection field, forming the "GUN trio" as innovative enterprises in global industrial X-ray inspection.





1

Current Development of the Global and China Industrial X-Ray Inspection Equipment Industry

2

The “GUN trio”: Pioneering the Future, Leading the Industry

3

Appendix

As a global growth consulting firm, Frost & Sullivan has 64 years of consulting experience and has long maintained a leading position as an industry advisor for companies going public overseas



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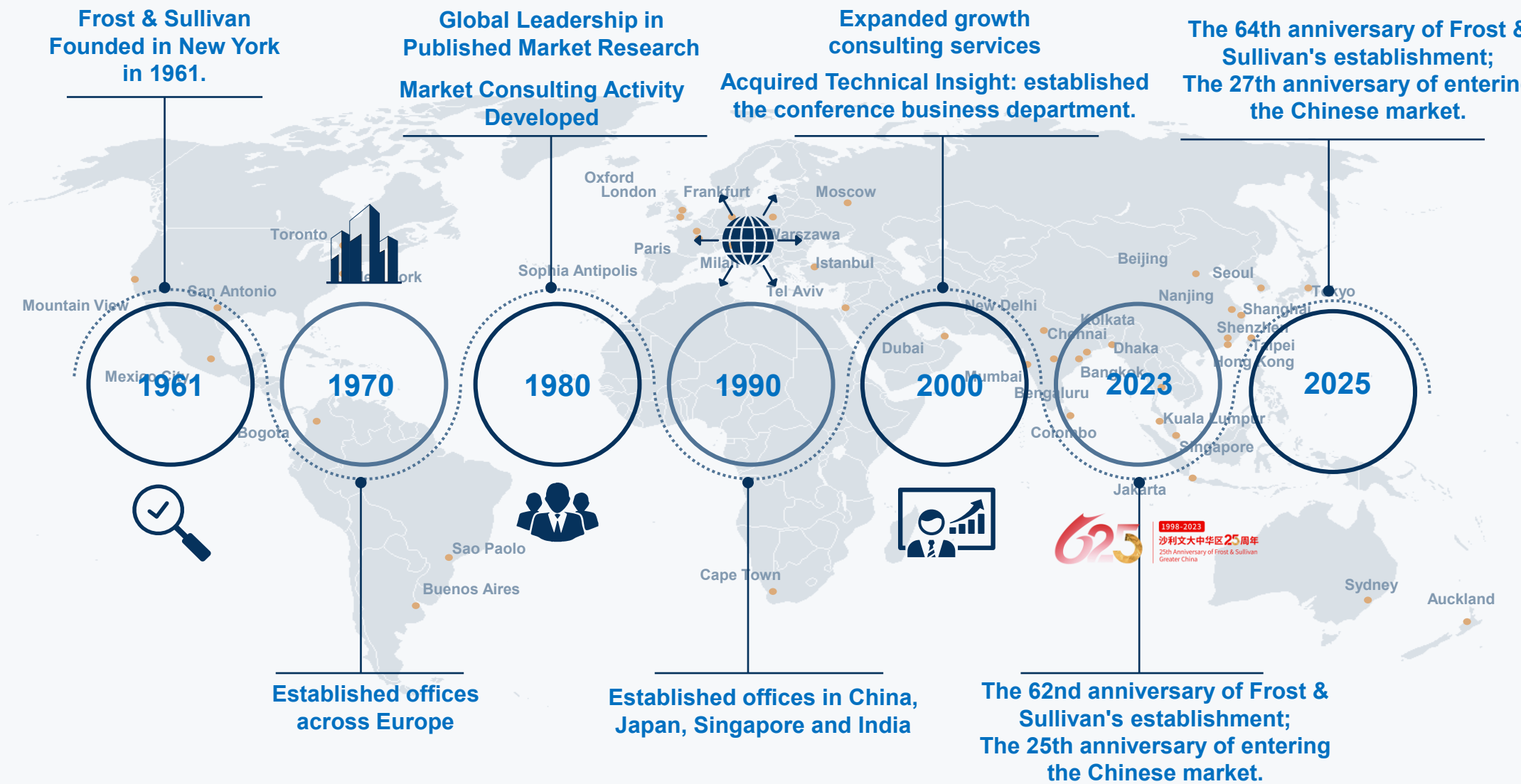
Leading Global Capital Markets Industry Advisor
Frost & Sullivan holds close to **70% market share** in the **Hong Kong** IPO market and has participated in **over 200 U.S. IPOs**.

- Since entering the Chinese market in 1998, Frost & Sullivan has accumulated over **27 years** of service experience in China and more than **20 years in overseas capital markets** advisory.
- From 2014 to 2024, Frost & Sullivan has consistently **ranked first** in market share for industry research advisors in the overseas IPO market.
- In the past three years, it has served **over 1,000** listed companies.
- In China, Frost & Sullivan has established 7 offices located in Beijing, Shanghai, Shenzhen, Nanjing, Chengdu, Hong Kong, and Taipei, and has set up big data research institutes in Nanjing and Shenzhen.

Leading Global Enterprise Growth Consulting Advisor
Frost & Sullivan works closely with the **vast majority of Global Fortune 1000** companies.

- Founded on Wall Street, USA, in 1961, Frost & Sullivan has a **64-year** global history. It operates **45 offices** worldwide with **over 3,000** consultants.
- provides comprehensive consulting services, including industry research, strategic consulting, and investment and financing advisory, covering **13 major sectors** such as consumer goods, transportation, internet technology, healthcare services, aerospace, and financial services.
- Leveraging years of accumulated experience, the company's cross-regional, pan-industry research capabilities help clients broaden their perspectives beyond single market domains.

Frost & Sullivan is one of the world's largest industry research and consulting institutions, with branches in 45 countries and regions globally. It enjoys high recognition and credibility in international capital markets.



With over 20 years of capital market experience, Frost & Sullivan Greater China operates through seven offices, collaborating with more than 500,000 industry and investment experts and over 500 senior analysts.



20+ years of experience

7 offices
Shanghai
Beijing
Nanjing
Chengdu

Hongkong
Shenzhen
Taipei



500,000+
Industry and investment experts

500+
Analyst and consultant



200+ Consulting projects related to advanced manufacturing every year

Frost & Sullivan's global investment management services, serving corporate growth consulting and market research services related to investment and financing

Enterprise growth

Brand Growth Service

- In-depth content services - blue books, in-depth articles, interviews with entrepreneurs
- Brand event services - Sullivan GIL awards, industry status confirmation, theme conference hosting

Internationalization Service

- Formulation of overseas strategy
- Industry assessment
- Brand going overseas - global release
- Product Going Overseas - International Pitch & Valuation Service

Growth Consulting Service

- Enterprise product listing, business development industry information provision
- Due diligence consulting for investment and financing business
- Enterprise M&A industry information provision



Enterprise investment and financing

Primary capital markets Financing services

- Business plan services
- Valuation services
- Sales forecast analytics
- Financing industry analysis report

IPO Services

- Industry consulting services
- Listing and issuance consulting services
- Technical consulting services
- Fundraising consulting services

Secondary capital market Financing services

- Market Value Management Services
- Annual reports and roadshow industry information updates
- Refinancing industry and fundraising advisory services

Profile of Company in Global X-Ray Inspection Equipment Market: UNICOMP



Company Profile

UNICOMP was established in 2009, focusing on the R&D and industrialization of industrial X-Ray inspection technology, committed to provide precision X-Ray inspection solutions for advanced manufacturing industries, fostering the intelligentization of manufacturing and digitalization of quality control. UNICOMP is dedicated to X-Ray imaging and inspection technologies for decades, whose products are widely applied in industries including semiconductor, new energy and electronic manufacturing.

Product Range

The product range covers X-Ray tube, electronic X-Ray, semiconductor X-Ray, casting and welding X-Ray, power battery X-Ray, intelligent counting machine, foreign object X-Ray inspection equipment and automotive X-Ray inspection equipment.



欢迎来到日联科技 (UNICOMP)



Profile of Company in Global X-Ray Inspection Equipment Market: Nordson Corporation



Company Profile

Nordson Corporation, founded in 1954 and headquartered in the United States, is specialized in precision gluing, coating, dispensing and inspection systems, operating in the industries including electronics, packaging, medical, and transportation.

Product Range

The product range covers precision dispensing systems, melter dispensing equipment, plasma treatment systems, X-Ray and optical inspection equipment, UV curing system, widely applied in industries including electronics manufacturing, packaging, medical devices and automotive parts.



Ultimus H1 Dispensers

High-precision benchtop fluid dispensing control for advanced applications of glues, oils, greases, epoxies, silicones, sealants, cyanoacrylates, solder pastes, and other assembly fluids dispensed with syringe barrels.

[VIEW DETAILS](#)



Performa Series Dispensers

Nordson EPD Performa™ Series fluid dispensers provide reliable benchtop dispensing control for general application of glues, oils, greases, epoxies, silicones, sealants, cyanoacrylates, solder pastes, and other assembly fluids dispensed with syringe barrels.

[VIEW DETAILS](#)



PICO Nougat Jetting System

The PICO Nougat™ is a small, 24V DIN-rail mounted jetting controller providing behind-the-scenes control of your PICO PureJet® XP valves using Industrial Ethernet protocols to improve programming convenience and efficiency.

[VIEW DETAILS](#)



General Purpose Dispense Tips

Made from burn-free, polished passivated stainless steel, Optimum® general purpose dispense tips are ideal for handling a wide range of assembly fluids.

[VIEW DETAILS](#)



Optimum Syringe Barrels

Optimum® syringe barrels feature ZeroCrack™ walls with consistent internal diameters that maintain a perfect seal with plunger to ensure accurate, consistent filling and dispensing with virtually no fluid waste.

[VIEW DETAILS](#)



ProBlue Flow Melter with Silicon Controls

The ProBlue Flow melter from Nordson is advanced technology that adapts to any operation with ease and simplicity. Depending on your unique circumstances, you can choose from factory options direct from Nordson, or smart and simple field upgrades, supported by Nordson's seasoned technical support representatives.

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We Deliver Innovative Precision Technology.

Find the right precision engineering or manufacturing product or solution for your business.

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Product Examples

Nordson Test & Inspection AXI Products



Semiconductor

The XS series is Nordson's flexible, small footprint inline AXI platform. The linear motors of the table and detector axes guarantee the highest possible speed and accuracy and make the XS machines the industry leading AXI solution for the semiconductor market.



SMT and Solder Joint Inspection

The X series is Nordson's high-speed AXI platform. The linear-motor driven table and detector axis-system ensures the highest possible speed with utmost accuracy for positioning. This system is our flagship platform for SMT and solder joint inspection and is hence available with the SMT setup



Inline X-ray Inspection Power Hybrid Application

The X# series is Nordson's high-flexibility AXI platform. These machines are available with a huge variety of table options to ensure that it can be used in a wide range of applications.

Profile of Company in Global X-Ray Inspection Equipment Market: Baker Hughes



Company Profile

Baker Hughes is a global leading energy technology company focusing on the provision of life-cycle technology solutions for drilling, completions, production and field optimisation for oil, gas and new energy industries. operating in more than 80 countries, Baker Hughes is dedicated to foster the energy transmission and low-carbon development.

Product Range

Baker Hughes has two main business divisions: Oilfield Services & Equipment and Industrial & Energy Technologies. Waygate Technologies, the Industrial Inspection Solutions division of Baker Hughes, is specialized in NDT technology and provides high-precision inspection equipment and digital solutions for a wide range of industries.



Featured Solutions

Products & Services

Company



Energy Transition
Energy technology to help the industry advance on the path to net-zero



Hydrogen Technologies
Advanced technologies to accelerate hydrogen deployment



Geothermal Solutions
Experience and expertise to redefine possibilities in geothermal



Carbon Capture, Utilization, and Storage
Integrated suite of solutions to capture, process, store, and monitor CO2 emissions



Emissions Abatement
Solutions to monitor and reduce emissions from industrial operations



Remote Operations
Digital operations, monitoring and testing capabilities to serve critical industries



AI by Baker Hughes C3.ai
Enterprise-scale artificial intelligence for energy operations



Liquefied Natural Gas
Industry leading solutions for long-term reliability, availability, and project success



Industrial Technology
Solutions to improve efficiency and uptime in processing and manufacturing industries



Cordant™
Proactive and connected digital solutions for industrial machines, equipment, and systems



Mature Assets Solutions
Revealing mature Assets and accelerating impact through integrated solutions



Flare Reduction
Creating new opportunities for value recovery and efficiency in flare reduction.



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Radiographic Testing and Industrial Computed Tomography Solutions

Ensure accurate, reliable insights with Waygate Technologies' advanced radiographic testing. Get access to precision imaging for the toughest challenges.

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Product Examples

Our radiographic testing and industrial CT equipment



PHOENIX XAMINER SYSTEM

The **Phoenix Xaminer** is Waygate Technologies' easy to use entry-level microfocus X-ray inspection (AXI) system with strong performance that is designed for the special needs of the high-resolution inspection of electronic assemblies, components and PCBs.

LEARN MORE



PHOENIX MICROMEIX NEO & NANOMEIX NEO

The **Phoenix Micromex Neo** and **Nanomex Neo** provide high-resolution 2D X-ray technology, **PlanarCT** and **3D computed tomography (CT)** scanning in one system. They are ideally suited for industrial X-ray electronics inspections in process and quality control for greater productivity, failure analysis, quality of your products, and R&D.

LEARN MORE



PHOENIX NANOTOM™ M

The **Phoenix Nanotom™ M** is a nanofocus X-ray CT system for scientific and industrial computed tomography (**microCT** and **nanoCT**) and 3D metrology. The system realizes a unique spatial and contrast resolution on a wide sample and application range.

LEARN MORE



PHOENIX VITOMEIX C450

The **Phoenix Vitomex C** is a high performance compact industrial 450 kV Minifocus CT system for inspection and 3D metrology of a wide applications range such as large light metal castings, turbine blades, AM parts etc. The **Vitomex C450** is also available with **Mesofocus** tube for more resolution.

LEARN MORE

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Source: Official websites, Frost & Sullivan



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