
INDUSTRY OVERVIEW

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OVERVIEW OF GLOBAL COPPER-PROCESSED PRODUCTS INDUSTRY

Overview of Ferrous and Non-ferrous Metals Industry

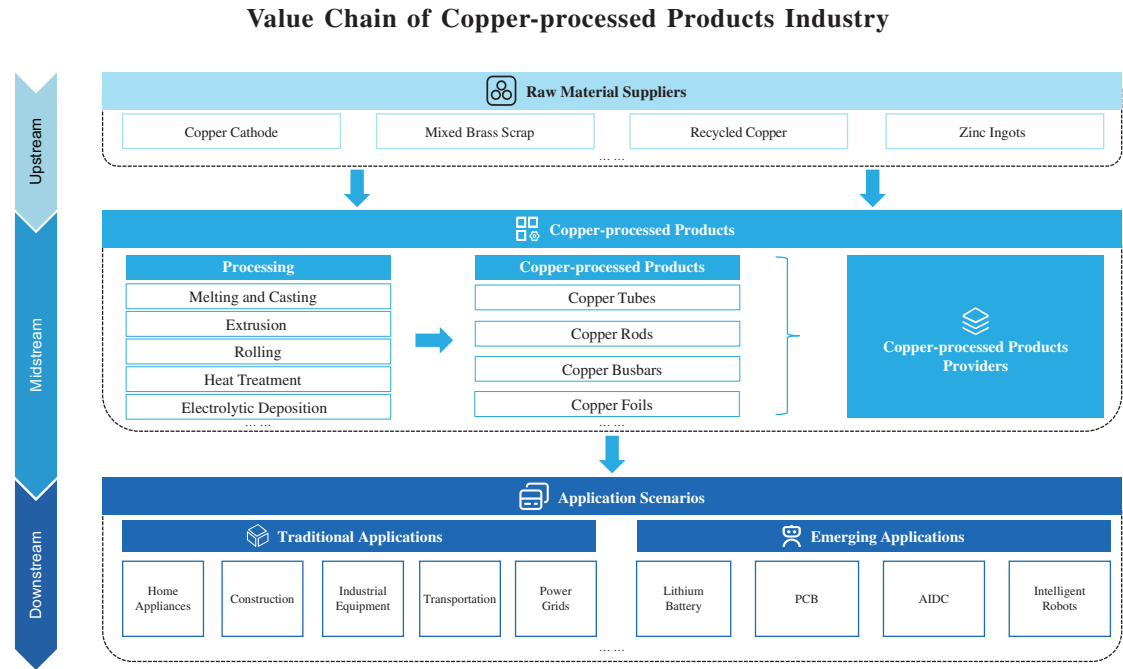
Ferrous metals are metals that contain iron and are generally strong, durable, and often magnetic but prone to rust and corrosion, making them ideal for construction, machinery, and automotive applications. Non-ferrous metals, on the other hand, do not contain significant iron and include metals such as copper; they are typically non-magnetic, corrosion-resistant, lighter, and may have special properties such as high electrical or thermal conductivity, making them suitable for aerospace, electronics, packaging, and other environments where rust resistance and lightweight materials are critical. The key differences between the two lie in iron content, magnetism, corrosion resistance, weight, and typical applications, with ferrous metals favoring strength and cost-effectiveness and non-ferrous metals providing versatility and resistance in demanding conditions.

Overview of Copper-processed Products Industry

As one of the most widely used and strategically significant non-ferrous metals globally, copper features high electrical conductivity, high thermal conductivity, superior ductility, corrosion resistance and recyclability, making it critical to electrical current transmission, thermal management and stable equipment operation. Copper is regarded as the “fossil fuels” of the AI era, supporting electrification, heat dissipation and energy use, thereby facilitating the development of AI infrastructure. Leveraging copper’s physical and chemical properties, copper processing companies utilize advanced processes to develop high-performance copper-processed products. These products are widely applied in core industrial applications including home appliances, construction, industrial equipment, power grids, and transportation. At the same time, copper-processed products are rapidly expanding into high-value emerging sectors. Growth in new energy, 5G communications and the electronic information industry is driving demand for high-performance copper foils and components, particularly in lithium batteries and advanced circuit applications, to enhance energy efficiency and signal stability. In AI-driven fields, copper plays a critical role in electrical conduction and thermal management, supporting stable operation under high power density conditions. Against the backdrop of the global energy evolution and the proliferation of computing infrastructure, copper has become a sophisticated, high-performance material characterized by precision and low-carbon attributes. This evolution reinforces the strategic positioning of copper as the key to AI-driven sectors.

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Value Chain Analysis of Copper-processed Products Industry



Sources: Frost & Sullivan

The upstream segment primarily consists of the supply of copper raw materials, which determine the cost structure and quality of copper-processed products. Leading companies bolster raw material security and price risk management capabilities by establishing recycled copper collection systems and international raw material trading networks, thereby achieving a low-carbon, stable supply chain. The midstream segment covers processing stages for core products such as copper tubes, copper rods, copper busbars and copper foils, including melting and casting, extrusion, rolling, heat treatment and electrolytic deposition. These processes define the electrical conductivity, thermal conductivity and mechanical properties of the products, creating critical value-add. The downstream segment encompasses wide-ranging applications across home appliances, construction, transportation, power grids and industrial equipment. Advanced copper-based products that feature high thermal and electrical conductivity play significant role in these applications.

Market Size Analysis of Global Copper-processed Products Industry

Copper-processed products’ market demand is closely related to macroeconomic condition. Driven by stable growth in core applications and robust expansion in emerging applications, the global copper-processed products industry as a whole has experienced a sustained growth. The market size of global copper-processed products industry expanded from approximately 30,260.0 thousand tons in 2021 to around 32,862.0 thousand tons in 2025, representing a CAGR of 2.1% during this period. Driven by emerging sectors such as 5G communications and AI technology, demand for premium copper-processed products continues to rise. The global market is projected to reach 36,461.0 thousand tons by 2030, with a CAGR of 2.1% from 2025 to 2030.

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Competitive Landscape Analysis of Global Copper-processed Products Industry

In 2025, global shipments of copper-processed products reached approximately 32,862.0 thousand tons. By shipment volume, the top five global providers of copper-processed products accounted for a combined market share of 20.1%, indicating a relatively fragmented market. The Group ranked third in 2025, with shipments of 993.0 thousand tons, representing a market share of 3.0%.

Ranking of the Top Five Providers of Global Copper-processed Products by Shipment Volume, 2025

Ranking	Company Name	Shipment Volume (Thousand Tons)	Market Share (%)	Headquarter
1	Company A	1,913.0	5.8%	China
2	Company B	1,906.0	5.8%	China
3	The Group	993.0	3.0%	China
4	Company C	930.0	2.8%	China
5	Company D	900.0	2.7%	The U.S
Top Five		6,642.0	20.1%	
Total		32,862.0		

Sources: China Non-Ferrous Metals Fabrication Industry Association (CNFA), Frost & Sullivan

Notes:

1. Company A, founded in 1979 and listed on the Hong Kong Stock Exchange, the London Stock Exchange, and the Shanghai Stock Exchange, is primarily engaged in the exploration, mining, beneficiation, smelting, and processing of copper and related non-ferrous metals.
2. Company B, founded in 1986 and listed on the Shanghai Stock Exchange, is primarily engaged in the R&D and production of copper and copper-alloy materials, providing comprehensive copper-processed products to support the development of strategic emerging industries such as 5G communications, new energy vehicles, rail transit, power IoT and smart cities.
3. Company C, founded in 1999 and listed on the Shenzhen Stock Exchange, is primarily engaged in advanced copper-processed products and military carbon materials, with products including precision copper strips, copper conductor materials, copper alloy wires, precision special steels, carbon fiber composite materials, and high-end thermal processing equipment.
4. Company D, founded in 1950, is primarily engaged in the production and processing of copper rod, copper wire and copper-processed cable products, with its products primarily used in power transmission and distribution.

OVERVIEW OF GLOBAL COPPER-PROCESSED PRODUCTS IN HVAC AND INDUSTRIAL APPLICATIONS INDUSTRY

Overview of Copper-processed Products in HVAC and Industrial Applications Industry

Copper-processed products in HVAC and industrial applications include copper tubes, copper rods, copper busbars and other copper-processed products to enable efficient transfer and distribution of thermal energy in refrigeration, heating and fluid circulation systems. Their core applications span HVAC equipment, building piping, sanitary systems, refrigeration appliances and industrial pipelines, supporting efficient energy utilization, construction of comfortable environments and stable industrial system operation. With accelerating global urbanization, rising industrial equipment energy efficiency standards and increasing living standards, the reliability,

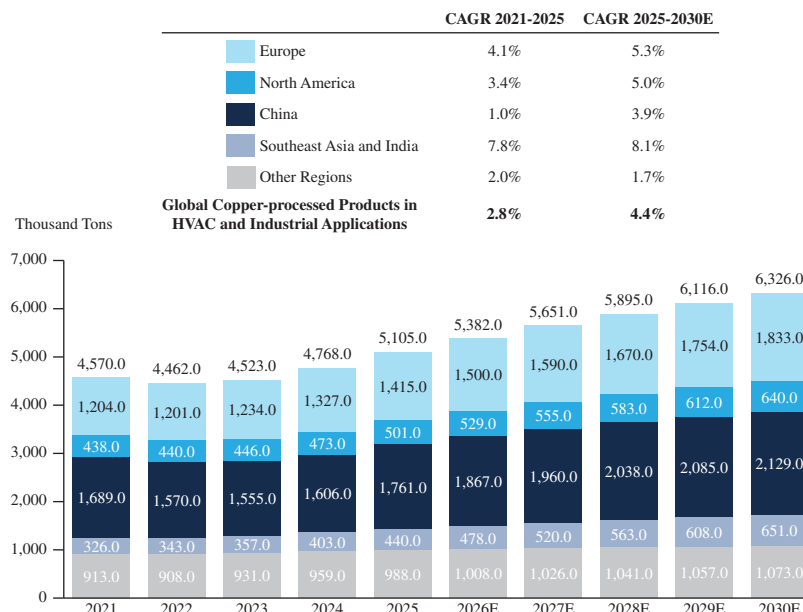
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energy efficiency and durability requirements for cooling, heating and fluid transport in building and industrial systems continue to grow. Leveraging copper’s excellent thermal conductivity, ductility and corrosion resistance, copper-processed products have become the core for heat exchange systems in building piping, sanitary systems and refrigeration equipment, providing critical support for building energy-efficient retrofits, green appliance adoption and efficient industrial heat utilization. Driven by global demand expansion, copper-processed products in HVAC and industrial applications are evolving toward thin-walled designs, precision structures, corrosion-resistant copper alloys, and system integration, enabling upgrades to high-performance, enduring, and integrated energy management products, thereby supporting the efficient operation of energy-efficient buildings, green appliances and industrial equipment worldwide.

Market Size Analysis of Global Copper-processed Products in HVAC and Industrial Applications Industry

In 2021, the global market size for copper-processed products in HVAC and industrial applications was approximately 4,570.0 thousand tons, increasing to around 5,105.0 thousand tons in 2025, representing a CAGR of 2.8% from 2021 to 2025. Driven by factors such as the upgrade of energy efficiency standards, replacement of equipment and ongoing building energy retrofit initiatives, the market is expected to reach 6,326.0 thousand tons by 2030, representing to a CAGR of 4.4% from 2025 to 2030. While Europe, North America, Southeast Asia, and India demonstrate higher growth rates, China’s historical and projected CAGR remains comparatively lower, largely due to the country’s mature installed base of HVAC and industrial systems, gradual pace of energy-efficient building retrofits, and slower penetration of high-end, copper-intensive equipment in industrial sectors. Furthermore, construction-led demand in China is influenced by regionally staggered renovation cycles, limiting uniform market expansion, though ongoing urbanization and infrastructure modernization continue to sustain baseline consumption.

Market Size of Global Copper-processed Products in HVAC and Industrial Applications Industry, by Shipment Volume, Breakdown by Regions, 2021-2030E



Sources: International Copper Association (ICA), International Wrought Copper Council (IWCC), Turner & Townsend, Wood Mackenzie, Frost & Sullivan

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Growth Drivers and Development Trends of Global Copper-processed Products in HVAC and Industrial Applications Industry

Expanding Downstream Industrial Applications

Driven by the high-efficiency construction, continuous expansion of new and renovated buildings, upgrades to energy efficiency regulations, and accelerated adoption of cooling and thermal management applications, market demand for copper-processed products continues to grow steadily. Various policies and regulations in the European Union and U.S. enhance the penetration of copper-based products. For instance, in the European Union, the recast Energy Performance of Buildings Directive (EU/2024/1275, EPBD) supports the energy-efficient renovation of existing buildings by considering the performance of technical building systems, including heating, cooling and domestic hot water, as well as the use of renewable energy. In the U.S., federal and state-level programs, including the Home Energy Rebates Program, NYS Clean Heat Program and TECH Clean California, incentivize whole-home retrofits and electrification measures such as heat pumps, heat pump water heaters, electrical wiring and load service center upgrades, supporting the market penetration of copper tubes, copper rods, copper busbars and other copper-processed products in renovation projects. In China, the State Council's 2024-2025 Energy Saving and Carbon Reduction Action Plan targets an increase of over 200 million square meters of retrofitted building area by 2025 compared with 2023, improving residential and public building energy efficiency by 30% and 20%, respectively, accelerating the renovation of aging residential complexes and urban renewal projects, and driving the replacement and upgrade of related copper-processed products.

In emerging markets such as Southeast Asia and India, growth is driven by new construction and infrastructure expansion. In Vietnam, sustained economic growth, as well as industrial facilities, residential and public building construction are boosting demand for HVAC systems and pipelines. In India, infrastructure investment, domestic manufacturing policies and urbanization support long-term growth in additional industrial and building demand. With regulatory improvements and rising expectations for comfort, safety and energy efficiency, copper-processed products are achieving higher penetration in HVAC systems, building pipelines, and sanitary systems, fueling the growth of the global copper-processed products industry.

Heightened Energy Efficiency and Reliability Requirements

Against the backdrop of rising energy efficiency standards in HVAC and industrial applications, copper-processed products are evolving toward high strength, high thermal conductivity and enhanced corrosion resistance. High-efficiency heat exchange products, such as internally threaded copper tubes, adopt smaller diameters, thinner walls and optimized structures to improve both mechanical performance and heat transfer efficiency, supporting overall system efficiency and cost optimization. Leading companies leverage mass production and intelligent manufacturing to achieve stable output and consistent quality of these complex products. At the same time, corrosion-resistant copper tubes have become a key innovation, utilizing optimized materials to extend equipment lifespan while maintaining thermal performance. Through automated production and quality traceability, industry leaders are able to balance high performance with scalable, green manufacturing, strengthening their competitiveness in the high-end component market.

Efficient, Low-Carbon and Intelligent Manufacturing

Leading companies adopt advanced algorithms and digital process control systems to implement intelligent management across the entire production and quality control process. Leveraging smart manufacturing platforms, they take the lead in achieving closed-loop process data management and automated quality inspection, significantly improving production efficiency and product consistency, while enhancing responsiveness to downstream customer customization requirements.

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The industry is promoting large-scale application of recycled copper purification and energy-saving production processes. Technical pathways such as energy-efficient electrolysis, waste heat recovery, and clean energy substitution help reduce production energy consumption and carbon intensity of products. Leading companies integrate smart manufacturing with green processing to improve environmental performance while maintaining high product performance and stable supply. This approach meets the energy-saving requirements of building, refrigeration, and industrial systems, advancing the industry toward high-quality, sustainable development.

Globalization and Localized Operations

As global demand for copper-processed products in HVAC and industrial applications grows, the industry is accelerating toward global expansion and localized production. In Europe and North America, stricter energy efficiency regulations, certification requirements and supply chain expectations are driving customers to prefer suppliers with local production and service capabilities. Meanwhile, emerging markets such as Southeast Asia and India are generating sustained demand due to manufacturing relocation, infrastructure development and urbanization. Leading enterprises are establishing production bases and processing networks across key regions, enabling faster market response, lower logistics costs and stronger supply chain resilience. Through standardized processes, unified quality systems and global coordination, they ensure consistent product performance across regions while enhancing operational efficiency and service capabilities for multinational customers, thereby reinforcing their global competitiveness.

Competitive Landscape Analysis of Global Copper-processed Products in HVAC and Industrial Applications Industry

The Group led the industry in 2025, with shipments of 918.1 thousand tons of copper-processed products in HVAC and industrial applications, representing a market share of 18.0%.

Ranking of the Top Five Providers of Copper-processed Products in HVAC and Industrial Applications by Shipment Volume, 2025

Ranking	Company Name	Shipment Volume (Thousand Tons)	Market Share (%)	Headquarter
1	The Group	918.1	18.0%	China
2	Company B	756.0	14.8%	China
3	Company E	600.0	11.8%	China
4	Company F	400.0	7.8%	Germany
5	Company G	367.0	7.2%	Germany
Top Five		3,041.1	59.6%	
Total		5,105.0		

Sources: China Non-Ferrous Metals Fabrication Industry Association (CNFA), Frost & Sullivan

Notes:

- Company E, founded in 2000, is mainly involved in the R&D and production of copper tubes and copper-alloy products, applied across multiple industrial sectors.
- Company F, founded in 1866 and listed on the Frankfurt Stock Exchange, mainly operates in copper smelting, copper-processed product manufacturing, precious metal refining and scrap copper recycling.
- Company G, founded in 1820, is primarily engaged in the production and sale of copper strips, sheets, rods, wires, tubes, sliding bearings, and other components.

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OVERVIEW OF GLOBAL COPPER FOILS FOR LITHIUM BATTERIES AND PCBs INDUSTRY

Overview of Copper Foils for Lithium Batteries and PCBs

Copper foil products for lithium batteries and PCBs are high-conductivity, high-ductility materials that serve as key components for current conduction and signal transmission, widely applied in NEVs, energy storage, consumer electronics and semiconductors. They support the efficient energy transfer and reliable integration of energy systems and electronic information systems.

Copper foil is a core component material of lithium batteries, responsible for carrying the anode material and transporting electrons within the cell. Its selection directly affects the energy density, safety performance, and lifespan of the battery. Against the backdrop of the accelerated development of the new energy industry, the increasing penetration rate of NEVs, the expansion of renewable energy installations, and the large-scale application of energy storage systems are driving rapid growth in battery demand. Driven by this trend, the demand for copper foils for lithium batteries continues to expand, while stricter requirements are imposed on copper foil thickness, surface quality, consistency of physical properties, and stability during long-term use. With advances in silicon-carbon cathode batteries, lithium batteries, solid-state batteries, fast-charging batteries and high-power-density technologies, the industry increasingly focuses on industrial innovation of copper foils that are high-strength and high-ductility, interface-stable, lithium-philic and thermally and chemically stable, further expanding the performance boundaries and application scenarios of copper foils for lithium batteries.

Copper foils serve as the conductive backbone of PCBs, enabling signal transmission and electromagnetic shielding. The growth of 5G communications, high-throughput computing and advanced packaging is driving demand for high-performance PCB copper foils, which offer low roughness, strong adhesion and excellent conductivity, improving high-frequency signal stability. As a result, these materials have become critical for advanced PCB and semiconductor packaging, with the segment continuing to evolve toward high-frequency, high-speed, low-loss and high-reliability applications.

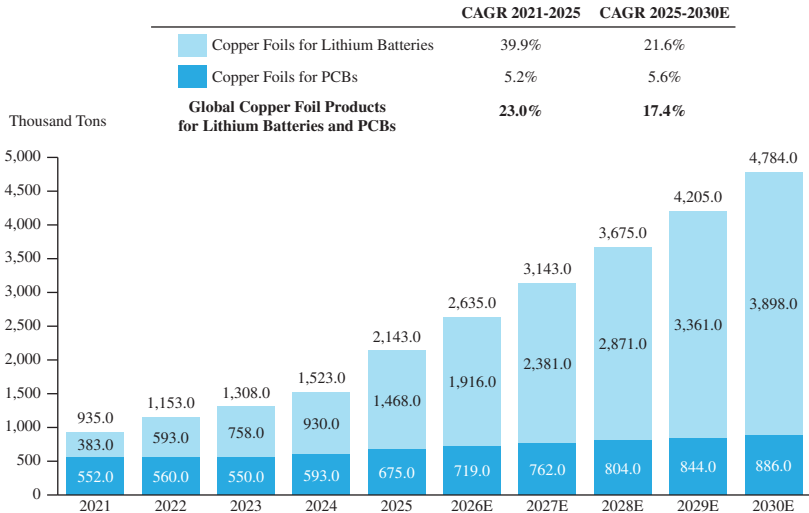
Market Size Analysis of Global Copper Foils for Lithium Batteries and PCBs

The global market size for lithium battery and PCB copper foils increased from approximately 935.0 thousand tons in 2021 to 2,143.0 thousand tons in 2025. With the rapid development of downstream markets, the global market size for lithium battery and PCB copper foils is expected to reach 4,784.0 thousand tons by 2030.

The market size of copper foils for lithium batteries by shipment volume grew from 383.0 thousand tons in 2021 to 1,468.0 thousand tons in 2025. This growth was driven by the continued expansion of NEVs, large-scale deployment of energy storage systems, and a increasing demand for smart devices. The market size is projected to reach 3,898.0 thousand tons by 2030. The market size of copper foils for PCBs by shipment volume, driven by upgrades in high-frequency and high-speed circuit requirements driven by 5G communications and AI computing is expected to reach 886.0 thousand tons by 2030.

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Market Size of Global Copper Foils for Lithium Batteries and PCBs, by Shipment Volume, Breakdown by Products, 2021-2030E



Sources: International Copper Association (ICA), International Wrought Copper Council (IWCC), Copper Foil Materials Subcommittee of the China Electronic Materials Industry Association (CCFA), Frost & Sullivan

Analysis of the Growth Drivers and Development Trends of Global Copper Foils for Lithium Batteries and PCBs Industry

Growing Global Demand for Lithium Batteries

Copper foils are a critical carrier for anode material support and electron transport, directly affecting battery energy density and service life. NEV penetration in China, Europe, and the U.S. is expected to exceed 65%, 25%, and 15% by 2030, respectively, encouraging demand for lithium battery copper foils. Additionally, the accelerating PV-storage integration, enhanced energy storage system efficiency, and the growing demand for large-scale stable power supply in energy-consuming infrastructure drives the demand for lithium battery copper foils. Global new installations of lithium-ion energy storage systems are projected to reach 1,164.7 GWh by 2030, stimulating demand for lithium battery copper foil. Emerging consumer electronics applications, such as AR/VR devices and foldable devices, are further driving the market demand for copper foils for lithium batteries.

Technological Advancement Toward Premium and Differentiated Products

The solid-state lithium battery is entering into the commercialization stage, with an expected penetration rate exceeding 10% by 2030. The solid-state battery imposes higher standards on the negative electrode current collector in terms of strength, ductility, heat and chemical resistance, and interface stability. Ultra-thin copper foil, in particular, faces stricter performance requirements for compression, tensile strength, powdering resistance and interface adhesion. In response, leading enterprises leverage grain structure refinement and surface functionalization processes to continually enhance copper foils' comprehensive mechanical performance under extreme thinness, and are deploying nickel-plated copper foil, double-sided roughened copper foil, nickel foil, and microporous copper foil for solid-state batteries and silicon-carbon anode applications.

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The rapid development of 5G communications, AI servers, and semiconductor packaging drives the adoption of premium copper foils for PCBs with ultra-low roughness and excellent signal integrity, significantly reducing high-frequency loss, making it a key material for high-speed circuits and advanced packaging.

Green and Intelligent Manufacturing and Global Localization Layouts

With the global expansion of NEVs, energy storage systems and electronic manufacturing industry, downstream customers increasingly demand supply stability, delivery efficiency and localized support capability. Against this backdrop, leading Chinese copper foil companies have taken the lead in establishing and commissioning overseas production bases of copper foils, marking a substantial breakthrough for Chinese copper foil manufacturers in overseas markets.

To align with global trends in green, low-carbon processing and intelligent digital manufacturing, the copper foil industry is accelerating the development of high-efficiency, low-carbon, automated and intelligent production systems. Leading enterprises, centered on the manufacturing needs of new energy materials, are systematically promoting the use of recycled raw materials, the replacement of energy-saving equipment, process energy efficiency optimization, and water resource recycling, while establishing closed-loop systems for the recycling, maintenance and reuse of major packaging materials. At the same time, companies are introducing highly automated and digitalized copper foil manufacturing lines, equipped with charge-coupled device (CCD) inspection systems, online thickness measurement, intelligent logistics, smart warehousing, and integrated distributed control system (DCS), manufacturing execution system (MES), enterprise resource planning (ERP), customer relationship management (CRM), learning management system (LMS), warehouse management system (WMS), intelligent security and digital twin systems, enabling intelligent collaboration and refined control across key processes from electrolysis and post-processing to slitting and packaging.

Competitive Landscape Analysis of Global Copper Foils for Lithium Batteries and PCBs Industry

The Group’s 2025 copper foil products for lithium batteries shipments reached 62.5 thousand tons, ranking fifth globally with a market share of 4.3%. The Group’s copper foils for lithium batteries experienced rapid growth, with shipment volume increasing from 34.0 thousand tons in 2024 to 62.5 thousand tons in 2025, representing a growth rate of 83.8% over the period. This is the fastest growth among the top five global copper foil products for lithium batteries providers, significantly exceeding the industry average growth rate of 57.9%.

The Group is the first Chinese company to successfully establish and commission a large-scale copper foil production base overseas, marking a substantive breakthrough for Chinese copper foil manufacturers in overseas plant construction and becoming an industry benchmark project. The Group has ranked first among Chinese copper foil suppliers in overseas production capacity and established a significant first-mover advantage in overseas markets.

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Ranking of the Top Five Providers of Global Copper Foils for Lithium Batteries by Shipment Volume, 2025

Ranking	Company Name	Shipment Volume (Thousand Tons)	Market Share (%)	2024-2025 YoY (%)	Headquarter
1	Company H	112.0	7.6%	23.7%	China
2	Company I	110.0	7.5%	55.8%	China
3	Company J	94.0	6.4%	60.3%	China
4	Company K	90.0	6.1%	40.6%	China
5	The Group	62.5	4.3%	83.8%	China
Top Five		468.5	31.9%		
Total		1,468.0			

Sources: Copper Foil Materials Subcommittee of the China Electronic Materials Industry Association (CCFA), China Non-Ferrous Metals Fabrication Industry Association (CNFA), Frost & Sullivan’s interviews with industry experts, Frost & Sullivan

Notes:

1. Company H was established in 1996, focusing on the R&D and manufacturing of high-end lithium battery copper foil, while also serving the power equipment, smart metering, and new energy solutions sectors.
2. Company I was established in 1985 and is listed on the Shenzhen Stock Exchange. It primarily engages in the R&D, production, and sales of various high-performance electrolytic copper foils.
3. Company J was established in 2016, mainly focusing on the R&D, production, and sales of lithium battery copper foil, applied in NEV power batteries, digital batteries, and energy storage batteries.
4. Company K was established in 2001 and is listed on the Shanghai Stock Exchange. Its main business includes the R&D, manufacturing, and sales of high-performance electrolytic copper foil, composite copper foil, and high-performance, high-precision copper alloy wire products.

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OVERVIEW OF GLOBAL COPPER-PROCESSED PRODUCTS FOR AI APPLICATIONS INDUSTRY

Overview of Copper-processed Products for AI Applications Industry

Driven by the rapid growth in AI-driven sectors, copper-processed products have emerged as a core enabler in the AI era due to their high electrical conductivity, high thermal conductivity, excellent ductility and structural stability. In particular, copper busbars and copper tubes leverage their advantages in high current-carrying capacity and efficient heat dissipation to empower the power supply, power transmission and thermal management systems of AIDC and intelligent robots, continuously driving technological upgrades and market demand expansion of copper-processed products.

With the continuous development of global AI computing, cloud computing, IoT, and 5G applications, the load capacity and power density of data centers have increased significantly. Copper-processed products are primarily used to ensure high-efficiency current transmission and stable power supply for high-power computing equipment, serving as critical components for power quality, supply continuity and safe operation of data centers. Meanwhile, the increased heat flux density in high-power density servers will drive the gradual adoption of liquid cooling systems as the mainstream thermal management architecture. Copper-processed products, owing to their superior thermal conductivity, ductility and structural stability, enable efficient heat management providing reliable support for systems under high-load, long-duration operating conditions.

At the same time, the rapid development of intelligent robots, particularly humanoid robots, is further driving the market demand for copper-processed products. The market size of humanoid robot is expected to exceed USD15 billion by 2030, with a CAGR of over 47% from 2025 onward. As computing configurations, joint drive power and system integration continue to increase, intelligent robots place stringent requirements on efficient current transmission, stable power supply and effective thermal dissipation within compact spaces. Copper-processed products play a critical role in efficient current conduction and thermal balancing. As intelligent robots evolve toward higher power, higher integration and long-duration continuous operation, the copper-processed products in ensuring overall system reliability becomes increasingly important, thereby driving the steady growth of market demand.

At the current stage, copper-processed products for AI applications remain at an early stage of commercialization, with evolving technical standards and relatively limited large-scale deployment.

Market Size Analysis of Global Copper-processed Products for AI Applications

In 2021, the global market size of copper-processed products for AIDC was approximately 69.0 thousand tons, growing to 418.0 thousand tons in 2025, representing a CAGR of 56.9%. Driven by accelerated capital investment in AI computing and deeper penetration of liquid cooling technologies, the market size is expected to reach 2,568.0 thousand tons by 2030, with a CAGR of approximately 43.8%.

Copper-processed products are a critical foundation for ensuring stable power supply to high-power drive systems and efficient overall thermal management in intelligent robots. Their shipment volume has gradually expanded alongside the acceleration of industry adoption. In 2021, the global market size for copper-processed products for intelligent robots by shipment volume was approximately 276.0 thousand tons, growing to 473.0 thousand tons in 2025, representing a CAGR of 14.4%. Driven by increasing computing power configurations, rising joint drive power, and the advancement of large-scale production, the market is expected to reach 1,101.0 thousand tons by 2030, with a CAGR of approximately 18.4%.

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Analysis of the Growth Drivers and Development Trends of Global Copper-processed Products for AI Applications

Increasing Global Demand for Computing

As global compute demand and capital investment continue to rise, high-throughput computing equipment is rapidly proliferating in AIDC, intelligent robots and other scenarios. In the AIDC field, high-power servers are driving accelerated adoption of liquid cooling products to meet overall system requirements for heat dissipation efficiency and energy performance. In intelligent robots field, high-power processors, motor drives, and actuators operate in confined spaces, imposing strict requirements for efficient heat dissipation and stable power delivery. Copper-processed products, as critical conductive materials in high-current-density power supply systems, also serve functions in heat transfer and thermal equalization. With the accelerated adoption of liquid cooling architectures, high-voltage power systems, and high-integration system, the demand for copper-processed products with high electrical conductivity, high thermal conductivity, high strength, and corrosion resistance is expected to continue growing.

Technological Advancement in Thermal Management Products

As data centers evolve toward larger scales and higher power densities, copper-processed products face higher demands for thermal conductivity, structural stability, and long-term reliability. In high-power-density racks and complex cooling piping environments, heat-dissipating copper materials must ensure efficient heat transfer while maintaining mechanical stability under long-term cyclic operation. In intelligent robots and high-load joint modules, the ongoing miniaturization and rising power density of servo motors and power control units similarly impose stringent requirements on copper-processed heat-dissipating and structural products, particularly in terms of thermal management and reliability under continuous, high-frequency operating conditions.

Additionally, to cope with high temperatures, high pressure, and long-term cyclic operation, companies are advancing the R&D of micro-alloyed copper, bronze, and cupronickel, optimizing material composition, microstructure, and post-treatment processes. This approach achieves simultaneous improvements in high-temperature resistance, corrosion resistance, and mechanical performance, promoting the evolution of copper-processed products from single components to integrated system applications, thereby increasing product value and application depth.

Advanced and Intelligent Manufacturing

Leading companies use AI algorithms and data-driven management to achieve full-process intelligent control of production lines. In liquid cooling applications and heat dissipation, leading companies are expanding from copper-processed products supply to liquid cooling modules and full system copper-processed products. At the same time, leading companies develop high-precision manufacturing equipment in-house, capable of high consistency, and microstructure processing. Combined with the adoption of recycled material refining and waste heat recovery technologies, this enables low-carbon, efficient manufacturing of copper-processed products while maintaining high performance.

OVERVIEW OF GLOBAL ALUMINUM-PROCESSED PRODUCTS INDUSTRY

The aluminum-processed products industry involves producing a variety of products, including aluminum sheets, strips, foils, rods, and profiles, using aluminum and aluminum alloys as raw materials through processes such as casting, rolling, extrusion, drawing, and heat treatment. Leveraging advantages such as light weight and ease of processing, aluminum-processed products have become essential components for structural parts, heat-conductive elements, packaging materials, and system-level application.

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Aluminum-processed products are widely applied across transportation, power grids, building structures, consumer electronics, and new energy sectors. In industrial and infrastructure applications, aluminum serves as a core material due to its excellent strength-to-weight ratio and cost balance. In areas such as NEVs and energy storage systems, aluminum’s lightweight, electrical conductivity, and thermal conductivity make it a critical carrier for energy transition. Driven by the rapid growth of the new energy sector, demand for aluminum-processed products continues to expand, with the industry evolving toward high-performance, high-value-added deep-processing and system-level products. The market size of aluminum-processed products industry has increased from 74,000.0 thousand tons in 2021 to 85,500.0 thousand tons in 2025 with a CAGR of 3.7%, and is expected to reach over 99,000.0 thousand tons in 2030, representing a CAGR of 3.0%.

ENTRY BARRIER ANALYSIS

The industry has high entry barriers, mainly in technology, globalization, and production scale. Technologically, leading companies leverage intelligent manufacturing and high-end equipment to achieve stable mass production of high-conductivity, high-thermal copper-processed products and provide customized products for high-value applications like AIDC and new energy, supported by industry-academia collaboration for continuous iteration. Globally, leading companies establish localized production and service networks covering R&D, logistics, and after-sales, enhancing market responsiveness, mitigating geopolitical risks, and optimizing resource allocation. In production scale, leading companies benefit from large-scale capacity and cross-regional coordination, gaining advantages in equipment investment, green upgrades, supply stability, and cost control. In contrast, new entrants face notable gaps in integrated process capabilities, global service networks, and scale-driven cost efficiency, limiting their competitiveness in high-end markets.

PRICE ANALYSIS OF RAW MATERIAL

Copper cathode is the core material of copper-processed products industry. As a highly standardized commodity with relatively strong liquidity, its average price is primarily influenced by macroeconomic conditions, supply—demand dynamics, policy guidance, and global market price trends. Between 2021 and 2025, the average price of LME copper cathode rose from USD9,313 per ton to USD9,939 per ton, while the SHFE copper cathode price rose from RMB67,729 per ton to RMB79,859 per ton, representing a CAGR of 1.6% and 4.2%, respectively. This price increase was driven mainly by two factors: first, the post-pandemic economic recovery spurred rapid rebound in industrial metal demand; second, energy consumption control policies constrained certain production capacities, further pushing up metal prices. For example, China’s 2021 Dual Control of Energy Consumption policy (《完善能源消費強度和總量雙控制度方案》) led certain local governments to impose power rationing and production curtailments on energy-intensive industries, including non-ferrous metal smelting. These measures reduced refined metal supply and tightened market conditions, thereby exerting upward pressure on metal prices. The average price of LME copper cathode declined from 2021 to 2023 primarily due to weaker global demand, amid COVID-19 lockdowns and slower economic growth. Additionally, a stronger US dollar and rising macroeconomic uncertainties, including higher interest rates and inflation, reduced speculative investment in base metals, collectively putting downward pressure on copper prices.

Given that copper cathode constitutes the principal raw material of the Group’s products, fluctuations in copper prices have directly affected the historical selling prices of the Group’s final products through a cost-plus pricing mechanism. Looking ahead, long-term demand drivers such as electrification, renewable energy deployment and infrastructure investment are expected to support a relatively elevated price trend for copper cathode. Leading companies have effectively mitigated the impact of raw material price volatility on costs by implementing refined inventory management, applying raw material hedging methods, and establishing recycled copper circular systems, thereby providing a more controllable and stable cost environment for business operations.

INDUSTRY OVERVIEW

For aluminum-processed products industry, the average price of SMM aluminum exhibited a generally upward but volatile trend from 2021 to 2025, increasing from approximately RMB18,910 per ton in 2021 to approximately RMB20,708 per ton in 2025. Price rose by 5.3% from 2021 to 2022, driven by global economic recovery, growing demand from the NEV and renewable energy sectors, and rising energy costs. Unlike copper, aluminum prices in China are primarily driven by supply-side constraints under strict capacity and energy consumption controls, which limited the impact of cyclical demand weakness during 2021 and 2022. In 2023, price declined due to a slowdown in global economic growth and temporary downstream demand adjustments, before gradually rebounding alongside improving market demand. From 2024 to 2025, the average price of SMM aluminum increased by approximately 4.2%. Looking ahead, as downstream demand stabilizes, aluminum price is expected to remain relatively stable.

SOURCE OF INFORMATION

The Group commissioned Frost & Sullivan to conduct market research on global copper-processed products and aluminum-processed products industry and prepare the Frost & Sullivan Report. Frost & Sullivan is an independent global consulting firm founded in 1961 in New York that offers industry research and market strategies. The Group has contracted to pay RMB590,000 to Frost & Sullivan for compiling the Frost & Sullivan Report.

In preparing the Frost & Sullivan Report, Frost & Sullivan conducted detailed primary research which involved discussing the status of the industry with certain leading industry participants and conducting interviews with relevant parties. Frost & Sullivan also conducted secondary research which involved reviewing company reports, independent research reports and data based on its own research database. Frost & Sullivan obtained the figures for the estimated total market size from historical data analysis plotted against macroeconomic data as well as considered the above-mentioned industry key drivers. Its market engineering forecasting methodology integrates several forecasting techniques with the market engineering measurement-based system and relies on the expertise of the analyst team in integrating the critical market elements investigated during the research phase of the project. These elements primarily include expert-opinion forecasting methodology, integration of market drivers and restraints, integration with the market challenges, integration of the market engineering measurement trends and integration of econometric variables.

Our Directors and the Joint Sponsors have exercised reasonable care in selecting and identifying the named information sources, compiling, extracting and reproducing the information, and ensuring no material omission of the information.