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Steel Casting Market By Type (Carbon Steel, Low-Alloy Steel, High-Alloy Steel, Others), By Process (Sand Casting, Investment Casting, Die Casting, Others), By Application (Power Generation, Rail and Transit, Mining, Construction Machinery, Oil and Gas, Others): Global Opportunity Analysis and Industry Forecast, 2025-2034

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Abstracts

The global steel casting market was valued at $33.1 billion in 2024, and is projected to reach $55.6 billion by 2034, growing at a CAGR of 5.4% from 2025 to 2034.

Introduction

Steel casting is a process in which molten steel is poured into a mold to solidify into a specific shape or component. This method allows the production of complex parts with high precision and strength. Steel casting is a critical process in manufacturing, widely used in industries ranging from automotive and aerospace to construction and power generation. The versatility and strength of cast steel make it a valuable material for producing components that need to endure extreme stress, high temperatures, or abrasive environments.

The steel casting process begins with the melting of steel scrap, alloys, and other metals. This is typically done in an electric arc furnace (EAF) or an induction furnace. The choice of furnace depends on the scale of production, the type of steel to be cast, and the specific properties required in the final product. In the electric arc furnace, large electrodes are used to generate an arc that melts the scrap metal, while in the induction furnace, an electromagnetic field is used to heat the metal.

In sand casting, a mixture of sand and binding agents is used to form the mold, which is typically an expendable mold. The mold is designed to withstand the intense heat of the molten steel and maintain its shape during the pouring and cooling stages. Metal molds, often made from cast iron or steel, are used in more advanced processes such as die casting, where the molds are reusable and suited for high-precision applications. Ceramic molds are generally used in investment casting for parts requiring intricate details and fine surface finishes.

Market Dynamics

Advancements in alloy steel is expected to drive the growth of steel casting market. Advancements in alloy steel have significantly increased the demand for steel castings across various industries. Alloy steel offers superior strength, enhanced performance, and improved resistance to wear, corrosion, and extreme temperatures by adding elements such as chromium, nickel, molybdenum, and vanadium to carbon steel. These properties make it ideal for high-demand sectors such as aerospace, automotive, energy, and heavy machinery. In April 2025, the UK government intervened to save British Steel’s Scunthorpe plant, promoting a shift from traditional blast furnaces to Electric Arc Furnaces (EAFs) to reduce carbon emissions by utilizing scrap steel and electricity instead of coal. The enhanced durability of alloy steel castings makes them particularly valuable in industries such as mining, construction, and heavy equipment manufacturing, where components face extreme stress and abrasion. Alloy steel castings are commonly used in mining machinery and other high-performance applications, reducing maintenance needs and extending equipment life.

However, environmental impact and sustainability challenges in steel casting is expected to hamper the growth of steel casting market. The steel casting industry is known for being energy-intensive, relying heavily on high-temperature processes such as melting and refining, which consume large amounts of energy. This results in significant emissions, including carbon dioxide (CO_2) and other greenhouse gases, which contribute to global warming and environmental degradation. The energy requirements for steel production, combined with the use of coal and other non-renewable resources, have long been a major environmental concern. Steel casting involves processes that emit harmful gases such as CO, SOx, NOx, particulate matter (PM2.5 and PM10), volatile organic compounds (VOCs), and other pollutants, including lead and cadmium. These emissions contribute to air quality degradation, respiratory problems, and broader climate change issues. Steel production, especially through traditional methods such as Basic Oxygen Steelmaking (BOS) and coke production, is energy-intensive and a major source of CO2 emissions, contributing heavily to climate change. Coke ovens release various toxic substances and require large amounts of water for cooling, which can become contaminated.

Segments Overview

The steel casting market is segmented into type, process, application, and region. On the basis of type, the market is divided into carbon steel, low-alloy steel, high-alloy steel, and others. On the basis of process, the steel casting market is categorized into sand casting, investment casting, die casting, and others. On the basis of application, the steel casting market is classified into power generation, rail and transit, mining, construction machinery, oil and gas, and others. By region, the market is analyzed across North America, Europe, Asia-Pacific, and LAMEA.

On the basis of type, carbon steel are the fastest growing segment in the market representing the CAGR of 5.3% during the forecast period. In industries such as construction, automotive, and heavy machinery, cast carbon steel components are widely used due to their excellent mechanical properties and ability to withstand heavy loads and harsh environments. Typical applications include gears, crankshafts, valves, pump casings, and heavy-duty structural components. Furthermore, carbon steel castings are often selected for parts that require a good balance between strength and cost-efficiency. The versatility of the casting process also allows manufacturers to produce large or uniquely shaped items with consistent quality, making it an indispensable technique for efficiently meeting the demands of modern engineering and industrial design.

On the basis of process, sand casting dominated the steel casting market, representing the CAGR of 4.9% during the forecast period. Steel castings produced through sand casting are commonly found in industries like construction, mining, automotive, shipbuilding, and heavy machinery manufacturing. Components such as gears, valves, pump casings, railroad parts, and structural supports are often made using this method. Sand casting is particularly advantageous for steel components because it accommodates complex geometries and large sizes that would be difficult or costly to produce using other casting methods. Moreover, the flexibility of sand molds allows for modifications and customizations without significant tooling changes, making it economical for both low and medium production volumes.

On the basis of application, power generation is the fastest growing segment in the steel casting market. In hydroelectric power generation, steel castings are essential in manufacturing turbine runners, guide vanes, and other critical hydraulic components. These parts require not only high strength but also excellent resistance to cavitation and erosion caused by continuous water flow under pressure. The ability to produce large, complex shapes through casting makes steel an ideal material for fabricating the massive parts needed for hydroelectric plants. In September 2024, the Indian government approved a ~$1.5 billion (?12,461 crore) outlay to support the development of 31,350 MW of hydropower capacity, including 15,000 MW from Pumped Storage Projects (PSPs). This scheme, applicable to projects above 25 MW, aims to enhance infrastructure such as roads, bridges, transmission lines, and communication facilities to facilitate project implementation. ?

On the basis of region, Asia-Pacific is the most lucrative region in the market. Steel casting plays a critical role in the industrial landscape of Asia-Pacific, driven by rapid urbanization, infrastructure development, and industrial expansion. Countries like China, India, Japan, and South Korea are at the forefront of steel casting usage, owing to their extensive manufacturing, automotive, construction, and energy sectors. China, the world's largest steel producer, dominates the regional market with massive demand for cast steel components in construction machinery, railways, heavy equipment, and shipbuilding. The government's focus on infrastructure megaprojects and renewable energy installations further accelerates the consumption of steel castings. India follows closely, experiencing a surge in demand fueled by "Make in India" initiatives, industrial corridor projects, and increasing automobile production. Steel castings are heavily utilized in sectors such as power generation, transportation, oil and gas, and mining equipment manufacturing.

Competitive Analysis

The key players operating in the steel casting market include ArcelorMittal, Nippon Steel Corporation, Eagle Alloy, Jindal Steel & Power Ltd, Harrison Steel Castings Company, Ferralloy Inc, Goodwin Steel Castings., Barron Industries, WHEMCO Steel Castings, William Cook Group.

Key Benefits For Stakeholders

This report provides a quantitative analysis of the market segments, current trends, estimations, and dynamics of the steel casting market analysis from 2024 to 2034 to identify the prevailing steel casting market opportunities.

The market research is offered along with information related to key drivers, restraints, and opportunities.

Porter's five forces analysis highlights the potency of buyers and suppliers to enable stakeholders make profit-oriented business decisions and strengthen their supplier-buyer network.

In-depth analysis of the steel casting market segmentation assists to determine the prevailing market opportunities.

Major countries in each region are mapped according to their revenue contribution to the global market.

Market player positioning facilitates benchmarking and provides a clear understanding of the present position of the market players.

The report includes the analysis of the regional as well as global steel casting market trends, key players, market segments, application areas, and market growth strategies.

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Upcoming/New Entrant by Regions

Technology Trend Analysis

Market share analysis of players by products/segments

New Product Development/ Product Matrix of Key Players

Patient/epidemiology data at country, region, global level

Regulatory Guidelines

Additional company profiles with specific to client's interest

Additional country or region analysis- market size and forecast

Expanded list for Company Profiles

Historic market data

Key player details (including location, contact details, supplier/vendor network etc. in excel format)

List of customers/consumers/raw material suppliers- value chain analysis

Market share analysis of players at global/region/country level

SWOT Analysis

Volume Market Size and Forecast

Key Market Segments

By Type

Carbon Steel

Low-Alloy Steel

High-Alloy Steel

Others

By Process

Sand Casting

Investment Casting

Die Casting

Others

By Application

Power Generation

Rail and Transit

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Mining

Construction Machinery

Oil and Gas

Others

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UK

Spain

Italy

Rest of Europe

Asia-Pacific

China

India

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- Japan
- South Korea
- Australia
- Rest of Asia-Pacific

LAMEA

- Brazil
- South Africa
- Saudi Arabia
- Rest of LAMEA

Key Market Players

- Ferralloy Inc
- ArcelorMittal
- Jindal Steel & Power Ltd.
- Eagle Alloy
- Barron Industries
- WHEMCO Steel Castings
- Harrison Steel Castings Company
- NIPPON STEEL CORPORATION
- Goodwin Steel Castings

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William Cook Group

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