

Automotive Engine Cylinder Block Market Assessment, By Vehicle Type [Passenger Car, Commercial Vehicles], By Material Type [Cast Iron, Aluminum Alloy], By Engine Capacity [Up to 1.5 Liters, 1.5 to 2.5 Liters, Over 2.5 Liters], By Region, Opportunities and Forecast, 2018-2032F

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Report description:

Global automotive engine cylinder block market is projected to witness a CAGR of 4.29% during the forecast period, 2025-2032, growing from USD 38.89 billion in 2024 to USD 54.40 billion in 2032. The automotive engine cylinder block market seems to be experiencing steady growth with increasing vehicle output, stringent emission regulations, and the requirement for lightweight yet resilient components of engine parts. Since manufacturers emphasize fuel efficiency and emissions, flexible cylinder block designs are a requirement for achieving maximum engine performance. The trend of turbocharged downsized engines also increases demand for robust blocks that can withstand increased combustion pressure without adding to weight.

Technological innovation is transforming the market, with the use of advanced materials like compacted graphite iron (CGI) and aluminum alloys to realize the best strength-to-weight ratio. The use of precision machining and casting technology allows advanced geometries that optimize thermal efficiency and minimize friction losses. Additionally, increased use of hybrid powertrains is generating the need for dedicated cylinder blocks that can be used to integrate electric motors. The aftermarket market is growing because vehicle aging requires engine replacement and rebuilding, keeping the demand for good cylinder blocks running. With the ongoing focus of the automobile market on efficiency, though in defiance of electrification tendencies, the cylinder block market is showing resilience. New developments in additive manufacturing and modular design are continuing to drive the flexibility and efficiency of production. As internal combustion engines mature along with hybrid technology, cylinder blocks will continue to be at the forefront of maintaining the balance of performance, efficiency, and durability. For instance, in April 2023, Rheinmetall AG booked a new order to produce engine blocks for a hybrid vehicle. The order, worth a figure in the mid-double-digit million-euro range, encompasses over 500,000 units. The customer is Shanghai Automotive Industry

Corporation (SAIC), China's largest maker of automobiles, motorcycles, and car parts. SAIC covers the complete spectrum of drive

technology, including vehicles with internal combustion engines, hybrid models, and vehicles that are powered entirely by electricity.

Innovation in Engine Block Technology Fuels Market Growth

Automotive engine cylinder block production is being transformed by advanced material science and manufacturing technologies. Manufacturers are incorporating compacted graphite iron (CGI) and high-strength aluminum alloys to make lighter yet stronger components to sustain higher combustion pressures. Additive manufacturing technology enables sophisticated internal cooling passages and optimized structures to improve heat management. Modular block architectures are on the rise to facilitate hybrid powertrain integration, enabling electric motor coupling with seamless coupling. These innovations respond to key needs in the industry - from achieving demanding emission regulations to enabling engine downsizing trends. As combustion technologies advance with electrification, new-generation cylinder blocks continue to be necessary to balance performance with efficiency demands.

For instance, in April 2023, Nissan Motor Co., Ltd. patented a design for an engine cylinder block made of composite materials, specifically a carbon fiber outer member, with the inner main block (where combustion happens) still made of metal. The outer member would be insulated from the heat by a water jacket, and the design aims to reduce weight and improve thermal management.

Strategic Collaborations Drive Engine Block Market Growth

Collaborations between vehicle manufacturers and material science companies are speeding up innovation in cylinder block technology. Joint ventures are creating new-generation alloys with improved strength-to-weight ratios and lower production costs. Suppliers and OEMs are collaborating to co-design modular block structures supporting both traditional and hybrid powertrains. Shared R&D investments and quicker commercialization of innovation, such as additive manufacturing methods, are facilitated by such collaborations. Technology transfer contracts between incumbent producers and startups are bringing Al-based design optimization to conventional casting operations. Such collaborations are especially important for creating sustainable solutions, such as low-carbon aluminum smelting for block manufacturing.

For instance, in March 2023, Rheinmetall AG announced a partnership with a company from Uzbekistan to provide initial support to manufacture engine blocks. Under the agreement, the first 100,000 units of this three-cylinder engine block were manufactured by the Group's Castings business unit in Neckarsulm, Germany, and shipped to Uzbekistan.

Passenger Cars Lead the Market Share

The passenger car segment is the biggest market for engine cylinder blocks, fueled by strong global production levels and ongoing powertrain technology advancements. Sedans, SUVs, and crossovers together command a huge demand, with manufacturers giving preference to light yet robust block designs. The segment's strength is driven by the emphasis of automakers on fuel-efficient engines, with a focus on downsized turbocharged engines needing solid blocks. The increase in the hybrid vehicle segment also supports demand, as such powertrains need bespoke blocks for mounting combustion and electric driving powertrain systems. With passenger cars subjected to regular engine platform changes to address emission regulations, cylinder block technology continues to be at the forefront of powertrain development. Both OEM fitment and aftermarket replacement support this segment's leadership position.

For instance, in May 2024, Aston Martin Lagonda Limited launched a potent new V12 engine, carrying on its tradition of luxury performance cars. The latest generation, following on from 25 years of V12-powered cars, is set to redefine the ultra-luxury model. With 835PS and 1000Nm of torque, Aston Martin states that its engineers have redesigned every component of the engine, from the cylinder block to the fuel injectors, to optimize combustion and overall performance. Some of the new engine's major features are a strengthened cylinder block, reworked cylinder heads with reprofiled camshafts, and strengthened intake and exhaust ports. All these features, along with fresh turbochargers for better throttle response, seek to provide better power and responsiveness.

Asia-Pacific Dominates Market Growth

Asia-Pacific is the world's leading automotive cylinder block market, spurred by its status as the world's largest automotive manufacturing center. China, Japan, and India are at the forefront of demand through robust passenger car and commercial vehicle production.

Three drivers of growth are major domestic vehicle manufacturing involving high-volume block demand, tight emission

regulations demanding sophisticated engine technologies, and cost-effective manufacturing facilities. The accelerated shift to hybrid vehicles in the region also further drives demand for specialized blocks supporting electric powertrain integration. Being home to major automakers and tier-1 suppliers, Asia Pacific continues its leadership in innovation in both traditional and next-generation cylinder block technologies.

For instance, in October 2024, Renault Nissan Automotive India Private Ltd (RNAIPL) is a joint venture between Renault and Nissan, reached a production milestone of 4.5 million units for engines and gearboxes. This includes 2.83 million engines and 1.67 million gearboxes. The manufacturing facility includes end-to-end capabilities to produce engines, from melting aluminium ingots, casting the molten metal into various engine parts such as the cylinder head and cylinder block at the casting shop, machining them to the perfect size and dimensions at the machining shop, and assembling them at the assembly shop. Impact of U.S. Tariffs on the Engine Cylinder Block Market

U.S. tariffs on imported cylinder blocks would raise costs for automakers relying on global supply chains, potentially increasing vehicle prices. Domestic manufacturers may gain competitiveness but face capacity gaps in advanced material production. High-performance and hybrid-specific blocks requiring specialized imports could see supply constraints. Tariffs may accelerate localized production of conventional blocks while spurring innovation in cost-efficient manufacturing techniques. Long-term effects could include supply chain diversification to tariff-exempt regions and slower adoption of premium block technologies in price-sensitive segments.

Key Players Landscape and Outlook

The market features global automotive suppliers competing through material innovation and precision manufacturing capabilities. Competition centers on developing lightweight yet durable blocks for diverse powertrains. OEM-aligned foundries lead in integrated engine solutions, while material specialists pioneer advanced alloys. Strategic automaker partnerships are critical, particularly for developing hybrid-compatible block architecture. Regional players in Asia leverage cost advantages in high-volume production, while European and American firms dominate premium and performance segments. Startups are disrupting with Al-optimized designs and sustainable casting processes. The aftermarket sees growing competition from certified remanufactured blocks.

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For instance, in April 2024, NEMAK SAB de CV, specialized in developing and manufacturing aluminium components for e-mobility, structure and chassis, received Aluminium Stewardship Initiative's Performance Standard V3 (2022) Certification for its three global production facilities in Poland, Slovakia, and Brazil. The three facilities, named Nemak Slovakia s.r.o., near Ladomerska Vieska, Slovakia; Nemak Poland Sp. z o.o in Bielsko-Biala, Poland; and Nemak Aluminio do Brazil Ltda in Betim, Mato Grosso, Brazil, produce a wide range of automotive components. The Brazil facility specialises in engine blocks, cylinder heads, and transmissions.

Table of Contents:

Project Scope and Definitions
 Research Methodology
 Impact of U.S. Tariffs
 Executive Summary
 Voice of Customers
 I. Respondent Demographics
 S.2. Brand Awareness
 S.3. Factors Considered in Purchase Decisions

5.4. Preferred Distribution Channel 6. Global Automotive Engine Cylinder Block Market Outlook, 2018-2032F 6.1. Market Size Analysis & Forecast 6.1.1. By Value 6.1.2. By Volume 6.2. Market Share Analysis & Forecast 6.2.1. By Vehicle Type 6.2.1.1. Passenger Car 6.2.1.2. Commercial Vehicles 6.2.2. □By Material Type 6.2.2.1. Cast Iron 6.2.2.2.∏Aluminum Alloy 6.2.3. □By Engine Capacity 6.2.3.1. Up to 1.5 Liters 6.2.3.2. 1.5 to 2.5 Liters 6.2.3.3. Over 2.5 Liters 6.2.4. By Region 6.2.4.1. North America 6.2.4.2. [Europe 6.2.4.3. Asia-Pacific 6.2.4.4. South America 6.2.4.5. Middle East and Africa 6.2.5. By Company Market Share Analysis (Top 5 Companies and Others - By Value, 2024) 6.3. Market Map Analysis, 2024 6.3.1. By Vehicle Type 6.3.2. By Material Type 6.3.3. □By Engine Capacity 6.3.4. By Region 7. North America Automotive Engine Cylinder Block Market Outlook, 2018-2032F 7.1. Market Size Analysis & Forecast 7.1.1.∏By Value 7.1.2. By Volume 7.2. Market Share Analysis & Forecast 7.2.1. □By Vehicle Type 7.2.1.1. Passenger Car 7.2.1.2. Commercial Vehicles 7.2.2. By Material Type 7.2.2.1. Cast Iron 7.2.2.2. Aluminum Alloy 7.2.3. By Engine Capacity 7.2.3.1. Up to 1.5 Liters 7.2.3.2.[]1.5 to 2.5 Liters 7.2.3.3. Over 2.5 Liters 7.2.4. □By Country Share 7.2.4.1. United States 7.2.4.2. Canada 7.2.4.3. [] Mexico

7.3. Country Market Assessment 7.3.1. United States Automotive Engine Cylinder Block Market Outlook, 2018-2032F* 7.3.1.1. Market Size Analysis & Forecast 7.3.1.1.1. By Value 7.3.1.1.2. By Volume 7.3.1.2. Market Share Analysis & Forecast 7.3.1.2.1. By Vehicle Type 7.3.1.2.1.1. Passenger Car 7.3.1.2.1.2. Commercial Vehicles 7.3.1.2.2. □By Material Type 7.3.1.2.2.1. □Cast Iron 7.3.1.2.2.2.∏Aluminum Alloy 7.3.1.2.3. By Engine Capacity 7.3.1.2.3.1. Up to 1.5 Liters 7.3.1.2.3.2.[]1.5 to 2.5 Liters 7.3.1.2.3.3. Over 2.5 Liters 7.3.2. Canada 7.3.3. Mexico *All segments will be provided for all regions and countries covered 8. Europe Automotive Engine Cylinder Block Market Outlook, 2018-2032F 8.1. Germany 8.2. France 8.3.∏Italy 8.4. United Kingdom 8.5. Russia 8.6. Netherlands 8.7. Spain 8.8. []Turkey 8.9. Poland 9. Asia-Pacific Automotive Engine Cylinder Block Market Outlook, 2018-2032F 9.1.∏India 9.2. China 9.3.∏Japan 9.4.
¬Australia 9.5. [Vietnam 9.6. South Korea 9.7. Indonesia 9.8. Philippines 10. South America Automotive Engine Cylinder Block Market Outlook, 2018-2032F 10.1. Brazil 10.2. Argentina 11. Middle East and Africa Automotive Engine Cylinder Block Market Outlook, 2018-2032F 11.1.∏Saudi Arabia 11.2. UAE 11.3. South Africa 12. Porter's Five Forces Analysis **13.** PESTLE Analysis

- 14. Market Dynamics
- 14.1. Market Drivers
- 14.2. Market Challenges
- 15. Market Trends and Developments
- 16. Case Studies
- 17. Competitive Landscape
- 17.1. Competition Matrix of Top 5 Market Leaders
- 17.2. SWOT Analysis for Top 5 Players
- 17.3. Key Players Landscape for Top 10 Market Players
- 17.3.1. Ryobi Limited
- 17.3.1.1. Company Details
- 17.3.1.2. Key Management Personnel
- 17.3.1.3. Products and Services
- 17.3.1.4. [Financials (As Reported)
- 17.3.1.5. Key Market Focus and Geographical Presence
- 17.3.1.6. Recent Developments/Collaborations/Partnerships/Mergers and Acquisition
- 17.3.2. MATSUMURA MOLD & PATTERN CO., LTD.
- 17.3.3. Chengdu Zhengheng Auto Parts Co., Ltd.
- 17.3.4. Linamar Corporation
- 17.3.5. YASUNAGA CORPORATION
- 17.3.6. Cooper Corporation
- 17.3.7. Ahresty Corporation
- 17.3.8. Teksid SpA
- 17.3.9. NEMAK SAB de CV
- 17.3.10. Albon Engineering & Manufacturing Plc
- *Companies mentioned above DO NOT hold any order as per market share and can be changed as per information available during research work.
- 18. Strategic Recommendations
- 19. About Us and Disclaimer



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