

# **Automotive Brake Friction Market - Global Industry Size, Share, Trends, Opportunity, and Forecast, 2018-2028 Segmented By Product Type (Brake Disc, Pad, Drum, Shoe, Liner), By Disc Material (Metallic Disc, Ceramic Disc), By Vehicle Type (Passenger Car, Lightweight Commercial Vehicle, Truck, Bus), By Type (Woven, Molded), By Regional, Competition**

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## **Abstracts**

Global Automotive Brake Friction Market has valued at USD 11.2 billion in 2022 and is anticipated to project robust growth in the forecast period with a CAGR of 3.9%. The global automotive brake friction market is a critical segment within the automotive industry, providing essential components that are fundamental to vehicle safety and performance. Brake friction materials, including brake pads and brake shoes, are integral to the braking system of every automobile, ensuring effective stopping power and reliable operation. In this market overview, we explore the key facets of the global automotive brake friction market.

The global automotive brake friction market has exhibited substantial growth over the years, driven by the increasing production of vehicles worldwide and the consistent demand for reliable and high-performance braking systems. As the automotive industry continues to expand to meet global demand, the need for brake friction materials is expected to maintain its growth trajectory. Additionally, the aftermarket segment plays a significant role in the market, as replacement and maintenance of brake friction components are essential for vehicle safety and operational efficiency.

One of the primary drivers of the global automotive brake friction market is the stringent safety regulations and standards imposed by governments and regulatory bodies

worldwide. These regulations mandate the use of high-quality brake friction materials to ensure vehicle safety and reduce the risk of accidents. Brake friction materials are critical in providing the necessary stopping power to bring vehicles to a halt effectively, especially in emergency situations.

Automakers and brake friction material manufacturers must continually innovate and develop materials that meet or exceed these safety standards, emphasizing the pivotal role of brake friction components in overall road safety.

Technological advancements in brake friction materials are shaping the market dynamics. Manufacturers are investing in research and development to create brake pads and shoes with improved performance characteristics. This includes enhancing braking efficiency, reducing noise and vibrations, and extending the lifespan of these components.

Advanced materials such as ceramic, carbon composite, and low-metallic formulations are being incorporated into brake friction materials to enhance their thermal stability, wear resistance, and overall performance. These innovations cater to consumer preferences for quieter and more durable braking systems while meeting regulatory requirements.

Environmental concerns and regulations are influencing the choice of materials in brake friction components. While ensuring safety remains paramount, there is a growing emphasis on developing eco-friendly friction materials that minimize the environmental impact. Manufacturers are exploring alternative materials and formulations that reduce the use of hazardous substances and mitigate brake dust emissions, which can have environmental and health implications.

The global automotive brake friction market is highly competitive, with numerous manufacturers and suppliers vying for market share. Intense competition often leads to price pressures, prompting manufacturers to focus on innovation and differentiation. Companies are investing in research and development to create unique brake friction materials that offer superior performance, durability, and environmental benefits.

Additionally, strategic collaborations and partnerships between automakers and brake friction material manufacturers are common, aiming to co-develop customized solutions and enhance product offerings.

Automakers are increasingly focused on vehicle lightweighting to improve fuel efficiency

and reduce emissions. While lightweighting efforts typically target vehicle structures and components, brake friction materials also play a role. Lighter brake friction components contribute to reducing overall vehicle weight, which supports automakers in achieving their efficiency and emissions reduction goals.

Manufacturers are exploring materials that maintain or enhance braking performance while being lighter, aligning with the broader automotive industry's push for sustainability.

The demand for brake friction materials is closely tied to the overall production of vehicles globally. As automotive production continues to expand, particularly in emerging markets, the need for these materials increases proportionally. Emerging economies represent significant growth opportunities for brake friction material manufacturers, as automakers establish production facilities in these regions to cater to local demand.

Additionally, the introduction of new vehicle models and segments creates specific requirements for brake friction materials, driving innovation and diversification in the market.

In conclusion, the global automotive brake friction market is a crucial component of the automotive industry, ensuring vehicle safety and performance. Its growth is propelled by stringent safety regulations, technological advancements, environmental considerations, market competition, vehicle lightweighting initiatives, global automotive production trends, and the essential role of brake friction materials in ensuring safe and efficient braking systems for vehicles worldwide. Manufacturers that adapt to these market dynamics and prioritize innovation are poised for success in this dynamic and evolving industry.

## Key Market Drivers

### Stringent Safety Regulations and Standards

One of the primary drivers of the global automotive brake friction market is the imposition of stringent safety regulations and standards by governments and regulatory bodies worldwide. These regulations are aimed at enhancing road safety by ensuring that vehicles can effectively and reliably come to a stop in various driving conditions. Brake friction materials are at the core of these safety requirements, as they directly influence a vehicle's braking performance.

Safety standards mandate that brake friction materials meet specific performance criteria, such as stopping distance, fade resistance, and noise levels. This necessitates continuous innovation and development in the formulation and manufacturing of brake pads and shoes to meet or exceed these stringent requirements. The pivotal role of brake friction materials in ensuring vehicle safety underscores their significance in the automotive industry.

### Increasing Vehicle Production

The growing production of vehicles worldwide is a significant driver of the global automotive brake friction market. As the automotive industry continues to expand to meet the rising demand for vehicles across various segments, the need for brake friction materials follows suit. Every vehicle, from passenger cars to commercial trucks, requires reliable and high-performance brake friction components to ensure safe and effective braking.

Moreover, the replacement and aftermarket segments of the market also contribute substantially to its growth. As vehicles age, their brake friction materials wear out and require replacement to maintain optimal braking performance. This ongoing demand for brake friction materials in the aftermarket further sustains the market's growth and stability.

### Technological Advancements in Brake Friction Materials

Technological advancements in brake friction materials are a driving force behind the global market's evolution. Manufacturers are continually investing in research and development to improve the performance, durability, and environmental sustainability of brake pads and shoes. These advancements are aimed at enhancing braking efficiency, reducing noise and vibrations, and extending the lifespan of brake friction components.

Advanced materials such as ceramic, carbon composite, and low-metallic formulations are being incorporated into brake friction materials to enhance their thermal stability, wear resistance, and overall performance. These innovations cater to consumer preferences for quieter and more durable braking systems while simultaneously meeting or exceeding regulatory requirements.

### Environmental Considerations

Environmental concerns and regulations are influencing the choice of materials and manufacturing processes in brake friction components. While safety remains the top priority, there is a growing emphasis on developing eco-friendly friction materials that minimize their environmental impact. Brake dust emissions, in particular, have garnered attention due to their potential environmental and health implications.

Manufacturers are exploring alternative materials and formulations that reduce the use of hazardous substances and mitigate brake dust emissions. This aligns with broader sustainability goals and regulatory requirements, driving the adoption of environmentally responsible brake friction materials.

### Market Competition and Innovation

The global automotive brake friction market is highly competitive, with numerous manufacturers and suppliers vying for market share. Intense competition fosters innovation as companies seek to differentiate themselves through product quality, performance, and technological advancements. Brake friction material manufacturers continually invest in research and development to create unique formulations that offer superior braking performance, durability, and environmental benefits.

Moreover, strategic collaborations and partnerships between automakers and brake friction material manufacturers are common, aiming to co-develop customized solutions that align with specific vehicle models and market demands. These collaborations often result in brake friction materials tailored to meet the exacting requirements of modern vehicles.

### Vehicle Lightweighting Initiatives

Automakers' concerted efforts to achieve vehicle lightweighting for improved fuel efficiency and reduced emissions have a direct impact on the global automotive brake friction market. While lightweighting primarily targets vehicle structures and components, brake friction materials also play a role. Lighter brake friction components contribute to reducing the overall weight of vehicles, supporting automakers in achieving their efficiency and sustainability goals.

Manufacturers are exploring materials that maintain or enhance braking performance while being lighter. This trend aligns with the broader automotive industry's push for sustainability and reduced environmental impact, further propelling the demand for advanced brake friction materials.

## Global Automotive Production Trends

The demand for brake friction materials is closely linked to the overall production of vehicles globally. As automotive production continues to expand, particularly in emerging markets, the need for these materials grows in tandem. Emerging economies represent significant growth opportunities for brake friction material manufacturers, as automakers establish production facilities in these regions to cater to local demand.

Furthermore, the introduction of new vehicle models and segments, including electric vehicles (EVs) and hybrid vehicles, creates specific requirements for brake friction materials. Manufacturers must continually adapt and innovate to meet the evolving needs of the automotive industry.

## Safety and Consumer Awareness

Increasing safety awareness among consumers and automakers is driving demand for advanced brake friction materials. Consumers are becoming more informed about the importance of braking performance and safety features in vehicles, leading to a preference for vehicles equipped with high-quality brake friction components. Automakers, in turn, prioritize safety as a key selling point for their vehicles, emphasizing the role of advanced brake friction materials in achieving optimal safety standards.

## Key Market Challenges

### Regulatory Compliance and Standardization

One of the foremost challenges in the global automotive brake friction market is navigating the complex landscape of regulatory compliance and standardization. Governments and regulatory bodies worldwide impose stringent safety and environmental standards on brake friction materials, requiring manufacturers to meet or exceed these standards.

Compliance with these standards necessitates extensive testing, validation, and certification processes, adding time and costs to the development and production of brake friction materials. Moreover, the regulatory landscape is not uniform across regions, requiring manufacturers to adapt their products to meet different sets of standards in various markets.

## Environmental Considerations and Emissions Reduction

Environmental concerns, particularly related to brake dust emissions, pose a significant challenge for the market. As brake friction materials wear down during vehicle use, they generate fine particles that can be harmful to the environment and human health. Regulatory bodies are increasingly focusing on mitigating these emissions, leading to pressure on manufacturers to develop low-dust or dust-free brake friction materials.

Developing environmentally responsible materials that minimize dust emissions while maintaining braking performance is a complex and ongoing challenge. Manufacturers must strike a balance between safety, environmental considerations, and consumer expectations.

## Rapid Technological Advancements

The automotive industry is characterized by rapid technological advancements, including changes in vehicle design, materials, and manufacturing processes. Brake friction material manufacturers must continually innovate to keep pace with these advancements. Failure to adapt to evolving trends and consumer demands can result in product obsolescence and a loss of market share.

Moreover, staying current with technological advancements requires skilled engineering talent and ongoing training, adding to operational costs and resource requirements.

## Competitive Market Landscape

The global automotive brake friction market is highly competitive, with numerous manufacturers and suppliers vying for market share. Intense competition can lead to pricing pressures, making it challenging for manufacturers to maintain healthy profit margins. To stay competitive, manufacturers must continually innovate, enhance product offerings, and differentiate themselves through quality, technology, and customer service.

Market competition also places an emphasis on cost-effectiveness. Manufacturers must explore ways to reduce production costs without compromising quality, which can be particularly challenging when dealing with complex brake friction materials that require precision engineering and high-quality raw materials.

## Material Innovation and Performance Demands

The demand for improved braking performance, reduced noise levels, and enhanced durability places significant pressure on brake friction material manufacturers to innovate. Developing advanced materials that meet or exceed performance expectations while complying with safety and environmental regulations is a multifaceted challenge.

Brake friction materials must effectively convert kinetic energy into thermal energy, provide consistent and reliable stopping power, and exhibit minimal wear under various driving conditions. Achieving these performance demands while ensuring safety and environmental responsibility requires extensive research and development efforts.

## Sustainability and Eco-Friendly Materials

Sustainability considerations are increasingly influencing the choice of materials and manufacturing processes in the automotive brake friction market. Consumers and regulators expect brake friction materials to be more environmentally friendly, requiring manufacturers to explore alternative materials and formulations that reduce the use of hazardous substances.

Developing eco-friendly brake friction materials that strike the right balance between safety, performance, and environmental impact is a complex challenge. Manufacturers must also consider the recyclability and disposal of brake friction materials at the end of their lifecycle, adding another layer of sustainability considerations.

## Supply Chain Vulnerabilities

The global automotive industry is susceptible to supply chain disruptions, which can impact brake friction material manufacturing. Events such as natural disasters, geopolitical tensions, trade disputes, and the COVID-19 pandemic have exposed the vulnerabilities of global supply chains. Brake friction material manufacturers rely on a network of suppliers for raw materials and components, making them susceptible to disruptions in the supply chain.

Supply chain disruptions can lead to material shortages, production delays, and increased costs. Manufacturers must develop resilient supply chains that can adapt to unforeseen challenges, including diversifying sourcing options and maintaining strategic stockpiles of critical materials.



## Intellectual Property Protection

Innovative brake friction material formulations and technologies are often subject to intellectual property (IP) concerns. Manufacturers must navigate IP challenges, including patent disputes and infringements. These legal complexities can lead to financial liabilities and disrupt business operations. Manufacturers must establish robust IP management strategies to protect their innovations while avoiding legal entanglements.

## Economic Uncertainty

Global economic uncertainties, including economic downturns, currency fluctuations, and trade policies, can impact the overall health of the automotive industry. Brake friction material manufacturers are not immune to such economic challenges, as they can affect consumer demand and automakers' production plans. Staying resilient and adaptable in the face of economic uncertainties is essential for market stability.

## Consumer Expectations and Market Trends

Changing consumer preferences and market trends can pose challenges for brake friction material manufacturers. Consumers are increasingly demanding vehicles with advanced features, customization options, and environmentally friendly attributes. Meeting these evolving expectations while balancing production costs and sustainability considerations requires continuous market analysis and adaptability.

## Key Market Trends

### Shift Towards Low-Copper and Copper-Free Brake Friction Materials

One of the most prominent trends in the automotive brake friction market is the shift towards low-copper and copper-free brake friction materials. Copper has historically been a common component in brake friction materials due to its excellent heat dissipation properties. However, increasing environmental concerns and regulatory restrictions on copper usage have prompted manufacturers to explore alternative materials.

Low-copper and copper-free brake friction materials typically employ a combination of non-copper additives, such as graphite, ceramics, and other materials, to achieve the

required performance characteristics. These materials reduce the environmental impact of brake dust emissions and align with regulations aimed at minimizing copper release into the environment. Manufacturers are investing in research and development to optimize the performance of these alternative materials while ensuring they meet or exceed safety and performance standards.

### Continued Development of Ceramic Brake Friction Materials

Ceramic brake friction materials have gained significant traction in the market due to their superior performance characteristics. Ceramic materials offer excellent heat resistance, fade resistance, and low noise levels, making them an attractive choice for consumers seeking high-performance braking systems. The use of ceramic materials also aligns with environmental goals, as they generate minimal brake dust emissions.

As a result, there is a continued focus on the development of advanced ceramic brake friction materials. Manufacturers are working on enhancing the durability and wear resistance of ceramics to meet the demands of modern vehicles. Ceramic materials are becoming increasingly common in premium and high-performance vehicles, reflecting a growing consumer preference for improved braking performance and reduced noise levels.

### Adoption of Advanced Friction Material Formulations

Brake friction material manufacturers are continually adopting advanced formulations to improve performance characteristics. These formulations incorporate a combination of materials, including organic compounds, resins, and reinforcement fibers, to achieve specific braking performance goals.

Advanced formulations aim to deliver consistent braking performance, reduced noise and vibrations, and enhanced durability under various driving conditions. Manufacturers are investing in research to fine-tune these formulations, balancing performance, wear resistance, and environmental considerations. The goal is to offer brake pads and shoes that provide optimal stopping power while meeting stringent safety and environmental standards.

### Growing Demand for High-Performance and Specialty Brake Friction Materials

The market is witnessing a growing demand for high-performance and specialty brake friction materials. Consumers are increasingly seeking vehicles with advanced braking

systems that offer superior stopping power, reduced noise levels, and enhanced durability. This demand extends to various vehicle segments, including passenger cars, sports cars, and performance-oriented vehicles.

As a result, manufacturers are developing specialty brake friction materials designed to meet the unique requirements of high-performance and sports vehicles. These materials often incorporate advanced formulations, such as carbon composite and ceramic blends, to provide exceptional braking performance and heat dissipation. Specialty brake friction materials cater to enthusiasts and consumers who prioritize superior braking performance in their vehicles.

### Eco-Friendly and Low-Dust Brake Friction Materials

Environmental considerations are driving the development of eco-friendly and low-dust brake friction materials. Brake dust emissions, which contain fine particles of materials from brake pads and shoes, can have environmental and health implications. In response, manufacturers are working to minimize brake dust generation while maintaining braking performance.

Low-dust brake friction materials use alternative materials and formulations that generate fewer airborne particles during braking. These materials reduce environmental impact, contribute to cleaner air quality, and align with regulatory efforts to mitigate brake dust emissions. Eco-conscious consumers are increasingly opting for vehicles equipped with low-dust brake friction materials, reflecting a broader trend toward sustainability in the automotive industry.

### Integration of Advanced Manufacturing Techniques

Manufacturing techniques for brake friction materials are advancing rapidly, contributing to improved product quality and consistency. Precision engineering, such as computer-controlled blending and mixing processes, ensures uniform material distribution in brake pads and shoes. Advanced molding and curing techniques enhance the durability and performance of the final products.

Computer-aided design (CAD) and simulation technologies play a significant role in the development and testing of brake friction materials. These tools enable manufacturers to optimize material formulations and predict performance accurately, reducing the need for costly physical prototypes and iterations. The integration of advanced manufacturing techniques supports the production of high-quality brake friction materials that meet

stringent performance requirements.

### Digitalization and Industry 4.0 Integration

Digitalization and Industry 4.0 technologies are making their way into the manufacturing of brake friction materials. Automation and robotics are used for tasks such as material handling, blending, and quality control. Sensors and data analytics enable real-time monitoring of manufacturing processes, leading to higher efficiency and precision.

Predictive maintenance using data from sensors helps prevent downtime and ensures the continuous operation of manufacturing facilities. Additionally, digitalization facilitates remote monitoring and control, enabling manufacturers to manage production across multiple locations efficiently.

### Customization and Market Segmentation

Customization is becoming increasingly important in the brake friction materials market. Manufacturers are offering a wide range of brake pad and shoe options tailored to different vehicle types, driving conditions, and consumer preferences. This trend allows consumers to select brake friction materials that best suit their needs, whether they prioritize performance, noise reduction, or eco-friendliness.

Market segmentation also plays a role, with manufacturers developing specialized brake friction materials for specific vehicle segments. For example, materials designed for electric vehicles (EVs) must accommodate the unique characteristics of EV braking systems. Customization and market segmentation enable manufacturers to meet the diverse demands of consumers and automakers.

### Global Expansion and Market Reach

Manufacturers in the brake friction market are expanding their operations globally to reach new markets and cater to the growing demand for brake friction materials. This global expansion allows manufacturers to access diversified supply chains, reduce risks associated with regional disruptions, and align their offerings with local market preferences and regulations.

Expanding into emerging automotive markets is a strategic move, as these regions experience increased vehicle production and consumer demand. By establishing a presence in these markets, manufacturers can capitalize on growth opportunities and

enhance their competitiveness.

### Sustainability and Recycling Initiatives

Sustainability is a central theme in the automotive brake friction market. Manufacturers are not only focusing on developing eco-friendly brake friction materials but also exploring recycling initiatives. Recycling programs aim to reduce waste and the environmental impact of discarded brake friction components.

Materials like copper and steel from worn-out brake pads and shoes can be recycled, contributing to resource conservation and reducing the industry's carbon footprint. Manufacturers are working on establishing efficient recycling processes and encouraging consumers to participate in responsible disposal and recycling practices.

### Segmental Insights

#### Vehicle Type Insights

The global Automotive Brake Friction market can be divided into two major segments based on vehicle type: passenger vehicles and commercial vehicles. Passenger vehicles hold a significant share due to their high global production and demand. These vehicles primarily employ disc brakes, which necessitate brake friction components such as brake pads and brake linings. On the other hand, commercial vehicles, including heavy trucks and buses, typically use drum brakes. Despite the smaller market share, the commercial segment is expected to exhibit substantial growth, driven by increasing infrastructural developments and the expanding e-commerce industry.

#### Disc Material Type Insights

The global automotive forging market showcases a wide variety of disc material types that play a pivotal role in vehicle performance. The prevalent types include carbon steel, alloy steel, stainless steel, and aluminum, each exhibiting unique properties. Carbon steel offers robust strength and is predominantly used in heavy-duty vehicles. Alloy steel, enhanced with other elements, provides superior strength and resistance, ideal for high-stress parts. Stainless steel offers excellent corrosion resistance, making it suitable for parts exposed to harsh environmental conditions. Lastly, aluminum, with its lightweight and corrosion-resistant characteristics, is becoming increasingly popular in the automotive industry, specifically for electric vehicles, where weight reduction is crucial.

## Regional Insights

The global automotive Brake Friction market showcases diverse regional characteristics. In North America, the market is driven by the high demand for vehicles and the robust automotive industry. The European region, with its strong focus on vehicle safety and stringent regulatory frameworks, is a significant contributor to the market's growth. The Asia-Pacific region, led by emerging economies like China and India, is witnessing rapid expansion due to increasing vehicle production and the growing adoption of advanced braking systems. Latin America and the Middle East & Africa, though smaller markets, are expected to show promising growth with improving economic conditions and increasing vehicle ownership.

## Key Market Players

Robert Bosch

Aisin Seiki

Federal-Mogul

Brembo

Tenneco

Akebono Brake Industries

Miba

SGL Group

Delphi

Nisshinbo Holding

## Report Scope:

In this report, the Global Automotive Brake Friction Market has been segmented into the following categories, in addition to the industry trends which have also been detailed

below:

Automotive Brake Friction Market, By Product Type:

Brake Disc

Pad

Drum

Shoe

Liner

Automotive Brake Friction Market, By Disc Material:

Metallic Disc

Ceramic Disc

Automotive Brake Friction Market, By Vehicle Type:

Passenger Car

Lightweight Commercial Vehicle

Truck

Bus

Automotive Brake Friction Market, By Type:

Woven

Molded

Automotive Brake Friction Market, By Region:

North America

United States

Canada

Mexico

Europe & CIS

Germany

Spain

France

Russia

Italy

United Kingdom

Belgium

Asia-Pacific

China

India

Japan

Indonesia

Thailand

Australia

South Korea



## South America

Brazil

Argentina

Colombia

## Middle East & Africa

Turkey

Iran

Saudi Arabia

UAE

## Competitive Landscape

Company Profiles: Detailed analysis of the major companies present in the Global Automotive Brake Friction Market.

## Available Customizations:

Global Automotive Brake Friction Market report with the given market data, Tech Sci Research offers customizations according to a company's specific needs. The following customization options are available for the report:

## Company Information

Detailed analysis and profiling of additional market players (up to five).

## Contents

### **1. INTRODUCTION**

- 1.1. Product Overview
- 1.2. Key Highlights of the Report
- 1.3. Market Coverage
- 1.4. Market Segments Covered
- 1.5. Research Tenure Considered

### **2. RESEARCH METHODOLOGY**

- 2.1. Objective of the Study
- 2.2. Baseline Methodology
- 2.3. Key Industry Partners
- 2.4. Major Association and Secondary Sources
- 2.5. Forecasting Methodology
- 2.6. Data Triangulation & Validation
- 2.7. Assumptions and Limitations

### **3. EXECUTIVE SUMMARY**

- 3.1. Market Overview
- 3.2. Market Forecast
- 3.3. Key Regions
- 3.4. Key Segments

### **4. IMPACT OF COVID-19 ON GLOBAL AUTOMOTIVE BRAKE FRICTION MARKET**

### **5. VOICE OF CUSTOMER ANALYSIS**

- 5.1. Brand Awareness
- 5.2. Brand Satisfaction
- 5.3. Factors Affecting Purchase Decision

### **6. GLOBAL AUTOMOTIVE BRAKE FRICTION MARKET OUTLOOK**

- 6.1. Market Size & Forecast
  - 6.1.1. By Volume & Value

## 6.2. Market Share & Forecast

6.2.1. By Product Type Market Share Analysis (Brake Disc, Pad, Drum, Shoe, Liner)

6.2.2. By Disc Material Market Share Analysis (Metallic Disc, Ceramic Disc)

6.2.3. By Vehicle Type Market Share Analysis (Passenger Car, Lightweight Commercial Vehicle, Truck, Bus)

6.2.4. By Type Market Share Analysis (Woven, Molded)

6.2.5. By Regional Market Share Analysis

6.2.5.1. Asia-Pacific Market Share Analysis

6.2.5.2. Europe & CIS Market Share Analysis

6.2.5.3. North America Market Share Analysis

6.2.5.4. South America Market Share Analysis

6.2.5.5. Middle East & Africa Market Share Analysis

6.2.6. By Company Market Share Analysis (Top 5 Companies, Others - By Value, 2022)

## 6.3. Global Automotive Brake Friction Market Mapping & Opportunity Assessment

6.3.1. By Product Type Market Mapping & Opportunity Assessment

6.3.2. By Disc Material Market Mapping & Opportunity Assessment

6.3.3. By Vehicle Type Market Mapping & Opportunity Assessment

6.3.4. By Type Market Mapping & Opportunity Assessment

6.3.5. By Regional Market Mapping & Opportunity Assessment

## 7. ASIA-PACIFIC AUTOMOTIVE BRAKE FRICTION MARKET OUTLOOK

### 7.1. Market Size & Forecast

7.1.1. By Volume & Value

### 7.2. Market Share & Forecast

7.2.1. By Product Type Market Share Analysis

7.2.2. By Disc Material Market Share Analysis

7.2.3. By Vehicle Type Market Share Analysis

7.2.4. By Type Market Share Analysis

7.2.5. By Country Market Share Analysis

7.2.5.1. China Market Share Analysis

7.2.5.2. India Market Share Analysis

7.2.5.3. Japan Market Share Analysis

7.2.5.4. Indonesia Market Share Analysis

7.2.5.5. Thailand Market Share Analysis

7.2.5.6. South Korea Market Share Analysis

7.2.5.7. Australia Market Share Analysis

7.2.5.8. Rest of Asia-Pacific Market Share Analysis

- 7.3. Asia-Pacific: Country Analysis
  - 7.3.1. China Automotive Brake Friction Market Outlook
    - 7.3.1.1. Market Size & Forecast
      - 7.3.1.1.1. By Volume & Value
    - 7.3.1.2. Market Share & Forecast
      - 7.3.1.2.1. By Product Type Market Share Analysis
      - 7.3.1.2.2. By Disc Material Market Share Analysis
      - 7.3.1.2.3. By Vehicle Type Market Share Analysis
      - 7.3.1.2.4. By Type Market Share Analysis
  - 7.3.2. India Automotive Brake Friction Market Outlook
    - 7.3.2.1. Market Size & Forecast
      - 7.3.2.1.1. By Volume & Value
    - 7.3.2.2. Market Share & Forecast
      - 7.3.2.2.1. By Product Type Market Share Analysis
      - 7.3.2.2.2. By Disc Material Market Share Analysis
      - 7.3.2.2.3. By Vehicle Type Market Share Analysis
      - 7.3.2.2.4. By Type Market Share Analysis
  - 7.3.3. Japan Automotive Brake Friction Market Outlook
    - 7.3.3.1. Market Size & Forecast
      - 7.3.3.1.1. By Volume & Value
    - 7.3.3.2. Market Share & Forecast
      - 7.3.3.2.1. By Product Type Market Share Analysis
      - 7.3.3.2.2. By Disc Material Market Share Analysis
      - 7.3.3.2.3. By Vehicle Type Market Share Analysis
      - 7.3.3.2.4. By Type Market Share Analysis
  - 7.3.4. Indonesia Automotive Brake Friction Market Outlook
    - 7.3.4.1. Market Size & Forecast
      - 7.3.4.1.1. By Volume & Value
    - 7.3.4.2. Market Share & Forecast
      - 7.3.4.2.1. By Product Type Market Share Analysis
      - 7.3.4.2.2. By Disc Material Market Share Analysis
      - 7.3.4.2.3. By Vehicle Type Market Share Analysis
      - 7.3.4.2.4. By Type Market Share Analysis
  - 7.3.5. Thailand Automotive Brake Friction Market Outlook
    - 7.3.5.1. Market Size & Forecast
      - 7.3.5.1.1. By Volume & Value
    - 7.3.5.2. Market Share & Forecast
      - 7.3.5.2.1. By Product Type Market Share Analysis
      - 7.3.5.2.2. By Disc Material Market Share Analysis

- 7.3.5.2.3. By Vehicle Type Market Share Analysis
- 7.3.5.2.4. By Type Market Share Analysis
- 7.3.6. South Korea Automotive Brake Friction Market Outlook
  - 7.3.6.1. Market Size & Forecast
    - 7.3.6.1.1. By Volume & Value
  - 7.3.6.2. Market Share & Forecast
    - 7.3.6.2.1. By Product Type Market Share Analysis
    - 7.3.6.2.2. By Disc Material Market Share Analysis
    - 7.3.6.2.3. By Vehicle Type Market Share Analysis
    - 7.3.6.2.4. By Type Market Share Analysis
- 7.3.7. Australia Automotive Brake Friction Market Outlook
  - 7.3.7.1. Market Size & Forecast
    - 7.3.7.1.1. By Volume & Value
  - 7.3.7.2. Market Share & Forecast
    - 7.3.7.2.1. By Product Type Market Share Analysis
    - 7.3.7.2.2. By Disc Material Market Share Analysis
    - 7.3.7.2.3. By Vehicle Type Market Share Analysis
    - 7.3.7.2.4. By Type Market Share Analysis

## **8. EUROPE & CIS AUTOMOTIVE BRAKE FRICTION MARKET OUTLOOK**

- 8.1. Market Size & Forecast
  - 8.1.1. By Volume & Value
- 8.2. Market Share & Forecast
  - 8.2.1. By Product Type Market Share Analysis
  - 8.2.2. By Disc Material Market Share Analysis
  - 8.2.3. By Vehicle Type Market Share Analysis
  - 8.2.4. By Type Market Share Analysis
  - 8.2.5. By Country Market Share Analysis
    - 8.2.5.1. Germany Market Share Analysis
    - 8.2.5.2. Spain Market Share Analysis
    - 8.2.5.3. France Market Share Analysis
    - 8.2.5.4. Russia Market Share Analysis
    - 8.2.5.5. Italy Market Share Analysis
    - 8.2.5.6. United Kingdom Market Share Analysis
    - 8.2.5.7. Belgium Market Share Analysis
    - 8.2.5.8. Rest of Europe & CIS Market Share Analysis
- 8.3. Europe & CIS: Country Analysis
  - 8.3.1. Germany Automotive Brake Friction Market Outlook

- 8.3.1.1. Market Size & Forecast
  - 8.3.1.1.1. By Volume & Value
- 8.3.1.2. Market Share & Forecast
  - 8.3.1.2.1. By Product Type Market Share Analysis
  - 8.3.1.2.2. By Disc Material Market Share Analysis
  - 8.3.1.2.3. By Vehicle Type Market Share Analysis
  - 8.3.1.2.4. By Type Market Share Analysis
- 8.3.2. Spain Automotive Brake Friction Market Outlook
  - 8.3.2.1. Market Size & Forecast
    - 8.3.2.1.1. By Volume & Value
  - 8.3.2.2. Market Share & Forecast
    - 8.3.2.2.1. By Product Type Market Share Analysis
    - 8.3.2.2.2. By Disc Material Market Share Analysis
    - 8.3.2.2.3. By Vehicle Type Market Share Analysis
    - 8.3.2.2.4. By Type Market Share Analysis
- 8.3.3. France Automotive Brake Friction Market Outlook
  - 8.3.3.1. Market Size & Forecast
    - 8.3.3.1.1. By Volume & Value
  - 8.3.3.2. Market Share & Forecast
    - 8.3.3.2.1. By Product Type Market Share Analysis
    - 8.3.3.2.2. By Disc Material Market Share Analysis
    - 8.3.3.2.3. By Vehicle Type Market Share Analysis
    - 8.3.3.2.4. By Type Market Share Analysis
- 8.3.4. Russia Automotive Brake Friction Market Outlook
  - 8.3.4.1. Market Size & Forecast
    - 8.3.4.1.1. By Volume & Value
  - 8.3.4.2. Market Share & Forecast
    - 8.3.4.2.1. By Product Type Market Share Analysis
    - 8.3.4.2.2. By Disc Material Market Share Analysis
    - 8.3.4.2.3. By Vehicle Type Market Share Analysis
    - 8.3.4.2.4. By Type Market Share Analysis
- 8.3.5. Italy Automotive Brake Friction Market Outlook
  - 8.3.5.1. Market Size & Forecast
    - 8.3.5.1.1. By Volume & Value
  - 8.3.5.2. Market Share & Forecast
    - 8.3.5.2.1. By Product Type Market Share Analysis
    - 8.3.5.2.2. By Disc Material Market Share Analysis
    - 8.3.5.2.3. By Vehicle Type Market Share Analysis
    - 8.3.5.2.4. By Type Market Share Analysis

### 8.3.6. United Kingdom Automotive Brake Friction Market Outlook

#### 8.3.6.1. Market Size & Forecast

##### 8.3.6.1.1. By Volume & Value

#### 8.3.6.2. Market Share & Forecast

##### 8.3.6.2.1. By Product Type Market Share Analysis

##### 8.3.6.2.2. By Disc Material Market Share Analysis

##### 8.3.6.2.3. By Vehicle Type Market Share Analysis

##### 8.3.6.2.4. By Type Market Share Analysis

### 8.3.7. Belgium Automotive Brake Friction Market Outlook

#### 8.3.7.1. Market Size & Forecast

##### 8.3.7.1.1. By Volume & Value

#### 8.3.7.2. Market Share & Forecast

##### 8.3.7.2.1. By Product Type Market Share Analysis

##### 8.3.7.2.2. By Disc Material Market Share Analysis

##### 8.3.7.2.3. By Vehicle Type Market Share Analysis

##### 8.3.7.2.4. By Type Market Share Analysis

## 9. NORTH AMERICA AUTOMOTIVE BRAKE FRICTION MARKET OUTLOOK

### 9.1. Market Size & Forecast

#### 9.1.1. By Volume & Value

### 9.2. Market Share & Forecast

#### 9.2.1. By Product Type Market Share Analysis

#### 9.2.2. By Disc Material Market Share Analysis

#### 9.2.3. By Vehicle Type Market Share Analysis

#### 9.2.4. By Type Market Share Analysis

#### 9.2.5. By Country Market Share Analysis

##### 9.2.5.1. United States Market Share Analysis

##### 9.2.5.2. Mexico Market Share Analysis

##### 9.2.5.3. Canada Market Share Analysis

### 9.3. North America: Country Analysis

#### 9.3.1. United States Automotive Brake Friction Market Outlook

##### 9.3.1.1. Market Size & Forecast

##### 9.3.1.1.1. By Volume & Value

##### 9.3.1.2. Market Share & Forecast

##### 9.3.1.2.1. By Product Type Market Share Analysis

##### 9.3.1.2.2. By Disc Material Market Share Analysis

##### 9.3.1.2.3. By Vehicle Type Market Share Analysis

##### 9.3.1.2.4. By Type Market Share Analysis

### 9.3.2. Mexico Automotive Brake Friction Market Outlook

#### 9.3.2.1. Market Size & Forecast

##### 9.3.2.1.1. By Volume & Value

#### 9.3.2.2. Market Share & Forecast

##### 9.3.2.2.1. By Product Type Market Share Analysis

##### 9.3.2.2.2. By Disc Material Market Share Analysis

##### 9.3.2.2.3. By Vehicle Type Market Share Analysis

##### 9.3.2.2.4. By Type Market Share Analysis

### 9.3.3. Canada Automotive Brake Friction Market Outlook

#### 9.3.3.1. Market Size & Forecast

##### 9.3.3.1.1. By Volume & Value

#### 9.3.3.2. Market Share & Forecast

##### 9.3.3.2.1. By Product Type Market Share Analysis

##### 9.3.3.2.2. By Disc Material Market Share Analysis

##### 9.3.3.2.3. By Vehicle Type Market Share Analysis

##### 9.3.3.2.4. By Type Market Share Analysis

## **10. SOUTH AMERICA AUTOMOTIVE BRAKE FRICTION MARKET OUTLOOK**

### 10.1. Market Size & Forecast

#### 10.1.1. By Volume & Value

### 10.2. Market Share & Forecast

#### 10.2.1. By Product Type Market Share Analysis

#### 10.2.2. By Disc Material Market Share Analysis

#### 10.2.3. By Vehicle Type Market Share Analysis

#### 10.2.4. By Type Market Share Analysis

#### 10.2.5. By Country Market Share Analysis

##### 10.2.5.1. Brazil Market Share Analysis

##### 10.2.5.2. Argentina Market Share Analysis

##### 10.2.5.3. Colombia Market Share Analysis

##### 10.2.5.4. Rest of South America Market Share Analysis

### 10.3. South America: Country Analysis

#### 10.3.1. Brazil Automotive Brake Friction Market Outlook

##### 10.3.1.1. Market Size & Forecast

##### 10.3.1.1.1. By Volume & Value

##### 10.3.1.2. Market Share & Forecast

##### 10.3.1.2.1. By Product Type Market Share Analysis

##### 10.3.1.2.2. By Disc Material Market Share Analysis

##### 10.3.1.2.3. By Vehicle Type Market Share Analysis



- 10.3.1.2.4. By Type Market Share Analysis
- 10.3.2. Colombia Automotive Brake Friction Market Outlook
  - 10.3.2.1. Market Size & Forecast
    - 10.3.2.1.1. By Volume & Value
  - 10.3.2.2. Market Share & Forecast
    - 10.3.2.2.1. By Product Type Market Share Analysis
    - 10.3.2.2.2. By Disc Material Market Share Analysis
    - 10.3.2.2.3. By Vehicle Type Market Share Analysis
    - 10.3.2.2.4. By Type Market Share Analysis
- 10.3.3. Argentina Automotive Brake Friction Market Outlook
  - 10.3.3.1. Market Size & Forecast
    - 10.3.3.1.1. By Volume & Value
  - 10.3.3.2. Market Share & Forecast
    - 10.3.3.2.1. By Product Type Market Share Analysis
    - 10.3.3.2.2. By Disc Material Market Share Analysis
    - 10.3.3.2.3. By Vehicle Type Market Share Analysis
    - 10.3.3.2.4. By Type Market Share Analysis

## **11. MIDDLE EAST & AFRICA AUTOMOTIVE BRAKE FRICTION MARKET OUTLOOK**

- 11.1. Market Size & Forecast
  - 11.1.1. By Volume & Value
- 11.2. Market Share & Forecast
  - 11.2.1. By Product Type Market Share Analysis
  - 11.2.2. By Disc Material Market Share Analysis
  - 11.2.3. By Vehicle Type Market Share Analysis
  - 11.2.4. By Type Market Share Analysis
  - 11.2.5. By Country Market Share Analysis
    - 11.2.5.1. Turkey Market Share Analysis
    - 11.2.5.2. Iran Market Share Analysis
    - 11.2.5.3. Saudi Arabia Market Share Analysis
    - 11.2.5.4. UAE Market Share Analysis
    - 11.2.5.5. Rest of Middle East & Africa Market Share Africa
- 11.3. Middle East & Africa: Country Analysis
  - 11.3.1. Turkey Automotive Brake Friction Market Outlook
    - 11.3.1.1. Market Size & Forecast
      - 11.3.1.1.1. By Volume & Value
    - 11.3.1.2. Market Share & Forecast

- 11.3.1.2.1. By Product Type Market Share Analysis
- 11.3.1.2.2. By Disc Material Market Share Analysis
- 11.3.1.2.3. By Vehicle Type Market Share Analysis
- 11.3.1.2.4. By Type Market Share Analysis
- 11.3.2. Iran Automotive Brake Friction Market Outlook
  - 11.3.2.1. Market Size & Forecast
    - 11.3.2.1.1. By Volume & Value
  - 11.3.2.2. Market Share & Forecast
    - 11.3.2.2.1. By Product Type Market Share Analysis
    - 11.3.2.2.2. By Disc Material Market Share Analysis
    - 11.3.2.2.3. By Vehicle Type Market Share Analysis
    - 11.3.2.2.4. By Type Market Share Analysis
- 11.3.3. Saudi Arabia Automotive Brake Friction Market Outlook
  - 11.3.3.1. Market Size & Forecast
    - 11.3.3.1.1. By Volume & Value
  - 11.3.3.2. Market Share & Forecast
    - 11.3.3.2.1. By Product Type Market Share Analysis
    - 11.3.3.2.2. By Disc Material Market Share Analysis
    - 11.3.3.2.3. By Vehicle Type Market Share Analysis
    - 11.3.3.2.4. By Type Market Share Analysis
- 11.3.4. UAE Automotive Brake Friction Market Outlook
  - 11.3.4.1. Market Size & Forecast
    - 11.3.4.1.1. By Volume & Value
  - 11.3.4.2. Market Share & Forecast
    - 11.3.4.2.1. By Product Type Market Share Analysis
    - 11.3.4.2.2. By Disc Material Market Share Analysis
    - 11.3.4.2.3. By Vehicle Type Market Share Analysis
    - 11.3.4.2.4. By Type Market Share Analysis

## **12. SWOT ANALYSIS**

- 12.1. Strength
- 12.2. Weakness
- 12.3. Opportunities
- 12.4. Threats

## **13. MARKET DYNAMICS**

- 13.1. Market Drivers

## 13.2. Market Challenges

## 14. MARKET TRENDS AND DEVELOPMENTS

## 15. COMPETITIVE LANDSCAPE

### 15.1. Company Profiles (Up to 10 Major Companies)

#### 15.1.1. Robert Bosch

15.1.1.1. Company Details

15.1.1.2. Key Product Offered

15.1.1.3. Financials (As Per Availability)

15.1.1.4. Recent Developments

15.1.1.5. Key Management Personnel

#### 15.1.2. Aisin Seiki

15.1.2.1. Company Details

15.1.2.2. Key Product Offered

15.1.2.3. Financials (As Per Availability)

15.1.2.4. Recent Developments

15.1.2.5. Key Management Personnel

#### 15.1.3. Federal-Mogul

15.1.3.1. Company Details

15.1.3.2. Key Product Offered

15.1.3.3. Financials (As Per Availability)

15.1.3.4. Recent Developments

15.1.3.5. Key Management Personnel

#### 15.1.4. Brembo

15.1.4.1. Company Details

15.1.4.2. Key Product Offered

15.1.4.3. Financials (As Per Availability)

15.1.4.4. Recent Developments

15.1.4.5. Key Management Personnel

#### 15.1.5. Tenneco

15.1.5.1. Company Details

15.1.5.2. Key Product Offered

15.1.5.3. Financials (As Per Availability)

15.1.5.4. Recent Developments

15.1.5.5. Key Management Personnel

#### 15.1.6. Akebono Brake Industries

15.1.6.1. Company Details

- 15.1.6.2. Key Product Offered
- 15.1.6.3. Financials (As Per Availability)
- 15.1.6.4. Recent Developments
- 15.1.6.5. Key Management Personnel
- 15.1.7. Miba
  - 15.1.7.1. Company Details
  - 15.1.7.2. Key Product Offered
  - 15.1.7.3. Financials (As Per Availability)
  - 15.1.7.4. Recent Developments
  - 15.1.7.5. Key Management Personnel
- 15.1.8. SGL Group
  - 15.1.8.1. Company Details
  - 15.1.8.2. Key Product Offered
  - 15.1.8.3. Financials (As Per Availability)
  - 15.1.8.4. Recent Developments
  - 15.1.8.5. Key Management Personnel
- 15.1.9. Delphi
  - 15.1.9.1. Company Details
  - 15.1.9.2. Key Product Offered
  - 15.1.9.3. Financials (As Per Availability)
  - 15.1.9.4. Recent Developments
  - 15.1.9.5. Key Management Personnel
- 15.1.10. Nisshinbo Holding
  - 15.1.10.1. Company Details
  - 15.1.10.2. Key Product Offered
  - 15.1.10.3. Financials (As Per Availability)
  - 15.1.10.4. Recent Developments
  - 15.1.10.5. Key Management Personnel

## **16. STRATEGIC RECOMMENDATIONS**

- 16.1. Key Focus Areas
  - 16.1.1. Target Regions & Countries
  - 16.1.2. Target By Product Type
  - 16.1.3. Target By Disc Material

## **17. ABOUT US & DISCLAIMER**

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