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Torque Vectoring Market – Global Industry Size, Share, Trends Opportunity, and Forecast, Segmented By Propulsion (Front Wheel Drive (FWD), Rear Wheel Drive (RWD), All Wheel Drive/Four Wheel Drive (AWD/4WD)), By Technology (Active Torque Vectoring System (ATVS), Passive Torque Vectoring System (PTVS)), By Vehicle Type (Passenger Cars, Light Commercial Vehicles, Heavy Commercial Vehicles), By Region, Competition, 2018-2028

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Abstracts

The Global Torque Vectoring Market size reached USD 10.83 Billion in 2022 and is expected to grow with a CAGR of 6.74% in the forecast period.

Torque vectoring is a technology used in automotive systems to enhance vehicle stability, handling, and overall performance. It involves the distribution of torque between the wheels of a vehicle to optimize its traction and control during various driving conditions. The global torque vectoring market has witnessed significant growth in recent years, driven by the increasing demand for high-performance vehicles and the growing emphasis on safety and stability in automotive design.

One of the key drivers of the torque vectoring market is the rising consumer preference for advanced driver assistance systems (ADAS) and active safety features. Torque vectoring systems contribute to improved vehicle dynamics by selectively braking or accelerating individual wheels, thereby enhancing cornering ability and stability. This is particularly important in sports cars and high-performance vehicles where precise control and handling are crucial.

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Another factor fueling the growth of the torque vectoring market is the continuous advancements in vehicle electrification and the development of electric and hybrid vehicles. Torque vectoring systems are often integrated into these vehicles to optimize power distribution between the front and rear axles or individual wheels, maximizing efficiency and performance.

The market is also influenced by regulatory initiatives promoting vehicle safety and emissions reduction. Manufacturers are increasingly incorporating torque vectoring technology to comply with stringent regulations and to meet the evolving preferences of consumers who seek both performance and environmental sustainability in their vehicles.

In terms of technology, torque vectoring systems have evolved from mechanical setups to more sophisticated electronic and software-based solutions. This transition has allowed for greater precision and adaptability, enabling vehicles to respond dynamically to changing driving conditions.

However, challenges such as high initial costs and the need for specialized maintenance could potentially hinder the widespread adoption of torque vectoring systems. Additionally, market dynamics may have evolved since my last update, with new technological developments, market entrants, or shifts in consumer preferences shaping the current landscape. Therefore, for the most accurate and recent information, it is recommended to consult the latest industry reports or market analyses.

Key Market Drivers

Performance Enhancement in High-End Vehicles

One of the primary drivers for the torque vectoring market is the increasing demand for high-performance vehicles. Torque vectoring systems enhance the dynamic performance of these vehicles by optimizing power distribution to individual wheels, improving traction, and enabling superior handling during acceleration and cornering.

Rising Popularity of Electric and Hybrid Vehicles

The global shift towards electric and hybrid vehicles has significantly impacted the torque vectoring market. As automakers focus on developing electric and hybrid platforms, torque vectoring technology becomes essential to optimize power delivery,

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improve efficiency, and enhance overall driving dynamics in these vehicles.

Growing Emphasis on Vehicle Safety and Stability

With an increasing focus on safety and stability in automotive design, torque vectoring systems play a crucial role in enhancing vehicle dynamics. By selectively applying torque to specific wheels, these systems improve traction and stability, especially during challenging driving conditions such as slippery surfaces or sharp turns.

Advancements in Advanced Driver Assistance Systems (ADAS)

The integration of torque vectoring into Advanced Driver Assistance Systems (ADAS) has been a notable driver. These systems contribute to overall vehicle safety by providing assistance in maintaining control during sudden maneuvers or adverse road conditions, reducing the risk of accidents.

Regulatory Requirements for Emission Reduction

Stringent emissions regulations worldwide have led automakers to explore technologies that improve fuel efficiency and reduce environmental impact. Torque vectoring systems contribute to these goals by optimizing power distribution, minimizing energy wastage, and improving overall vehicle efficiency.

Technological Advancements in Torque Vectoring Systems

Ongoing advancements in electronic and software-based solutions have led to more sophisticated torque vectoring systems. These advancements enable finer control and adaptability, allowing vehicles to respond dynamically to changing driving conditions, further enhancing their performance and safety.

Consumer Demand for Enhanced Driving Experience

Consumer preferences for a superior driving experience, including precise control, improved handling, and enhanced stability, are driving the adoption of torque vectoring systems. As customers become more discerning, automakers are increasingly incorporating these technologies to meet and exceed expectations.

Increased Competition among Automotive Manufacturers

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The competitive landscape within the automotive industry has driven manufacturers to differentiate their offerings. Torque vectoring technology provides a market advantage, especially for companies specializing in high-performance and premium vehicles, leading to its increased adoption as a competitive strategy.

Key Market Challenges

High Initial Costs

The implementation of torque vectoring systems involves advanced technology and sophisticated components, leading to higher production costs. The initial expenses associated with developing and integrating these systems into vehicles can pose a challenge, particularly for manufacturers aiming to offer cost-effective solutions to consumers.

Complex Maintenance Requirements

Torque vectoring systems, being complex electronic and software-based technologies, may require specialized maintenance. This can lead to higher service costs and potential challenges for consumers in terms of finding qualified technicians capable of servicing these advanced systems.

Integration with Existing Vehicle Architectures

Retrofitting existing vehicle models with torque vectoring systems can be a challenging task. Integrating these systems seamlessly into diverse vehicle architectures without compromising other functionalities may require significant engineering efforts and investments.

Weight and Space Constraints

The additional components and hardware required for torque vectoring systems can contribute to increased weight and space requirements. For electric vehicles aiming to optimize efficiency, any additional weight can impact overall performance and range, posing a challenge for integration.

Limited Awareness and Consumer Education

The benefits of torque vectoring systems are not always well understood by consumers.

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Limited awareness and understanding of how these systems improve vehicle performance and safety can be a hurdle for widespread adoption. Educating consumers about the advantages of torque vectoring becomes crucial.

Compatibility Issues with Other Vehicle Systems

Integrating torque vectoring technology into vehicles must consider compatibility with other onboard systems, such as anti-lock braking systems (ABS) and electronic stability control (ESC). Ensuring seamless integration without conflicts or performance degradation can be a challenging task.

Standardization Challenges

The absence of standardized specifications for torque vectoring systems can pose challenges for the industry. Different manufacturers may implement proprietary solutions, hindering interoperability and potentially limiting the availability of third-party components or aftermarket upgrades.

Market Competition and Differentiation

As torque vectoring becomes more prevalent, the competitive landscape intensifies. Automotive manufacturers must find ways to differentiate their torque vectoring offerings to stand out in the market. This can lead to increased research and development costs and challenges in defining unique value propositions.

Key Market Trends

Rise of Electric and Hybrid Vehicles

The increasing adoption of electric and hybrid vehicles is a significant trend driving the torque vectoring market. These advanced propulsion systems benefit from torque vectoring technology to optimize power distribution, enhance efficiency, and improve overall vehicle dynamics.

Integration with Advanced Driver Assistance Systems (ADAS)

The trend towards more advanced safety features, including ADAS, is influencing the torque vectoring market. Manufacturers are integrating torque vectoring into broader safety and assistance systems to improve vehicle stability, traction control, and overall

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safety during various driving conditions.

Continued Development of Software-Based Solutions

The torque vectoring market is witnessing a shift towards more sophisticated software-based solutions. Continuous advancements in electronic control systems and software algorithms allow for finer control and adaptability, enabling vehicles to respond dynamically to changing driving conditions.

Focus on Weight Reduction and Efficiency

Automotive manufacturers are increasingly focusing on weight reduction to enhance overall vehicle efficiency, especially in the context of electric vehicles. Torque vectoring systems that contribute to improved handling without adding excessive weight are gaining traction in the market.

Increased Emphasis on Customization and User Experience

Consumers are placing a growing emphasis on personalized driving experiences. Torque vectoring systems that offer customizable settings and modes, allowing drivers to tailor the driving dynamics to their preferences, are becoming more popular.

Advancements in Sensor Technologies

The accuracy and effectiveness of torque vectoring systems depend on sensor technologies. Ongoing advancements in sensor technologies, including more precise and responsive sensors, contribute to the overall improvement of torque vectoring capabilities.

Collaborations and Partnerships in the Automotive Ecosystem

Collaboration among automotive manufacturers, technology companies, and suppliers is becoming increasingly common. These partnerships aim to leverage collective expertise for the development and integration of advanced torque vectoring systems, fostering innovation and accelerating market growth.

Global Regulatory Push for Vehicle Safety and Emission Reduction

Worldwide regulatory initiatives focusing on vehicle safety and emissions reduction

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continue to shape the torque vectoring market. Manufacturers are compelled to incorporate technologies that enhance both safety and efficiency to comply with stringent global standards.

Segmental Insights

By Propulsion

In the Front Wheel Drive (FWD) segment, torque vectoring technology is often employed to enhance the performance and handling characteristics of vehicles where power is primarily directed to the front wheels. Torque vectoring in FWD systems helps improve traction during acceleration and cornering, mitigating understeer and enhancing overall stability. This configuration is commonly found in compact cars, sedans, and some crossovers, where optimizing front-wheel dynamics becomes crucial for a balanced driving experience.

Torque vectoring in Rear Wheel Drive (RWD) configurations is designed to optimize power distribution to the rear wheels, enhancing vehicle dynamics, especially in sports cars and performance-oriented vehicles. RWD torque vectoring systems contribute to better handling during acceleration, braking, and cornering, providing drivers with a more engaging and responsive driving experience. This configuration is often favored in high-performance and luxury vehicles that prioritize a rear-wheel power delivery setup.

The All-Wheel Drive/Four Wheel Drive (AWD/4WD) segment is characterized by vehicles that distribute power to all wheels. Torque vectoring in AWD/4WD systems is versatile, enhancing traction and stability across various driving conditions, including off-road scenarios and inclement weather. This configuration is popular in SUVs, crossovers, and some high-performance cars, offering a balance between on-road performance and off-road capability. Torque vectoring optimizes power distribution among all wheels, reducing wheel slippage and enhancing overall vehicle control.

The implementation of torque vectoring across these propulsion segments reflects a broader trend in the automotive industry toward improving driving dynamics, safety, and performance. Each configuration presents unique challenges and opportunities for torque vectoring technology, as engineers tailor these systems to complement the inherent characteristics of FWD, RWD, or AWD/4WD vehicles. As consumer preferences continue to evolve, and technological advancements persist, the torque vectoring market within each propulsion segment is likely to experience further innovations and refinements to meet the diverse demands of the global automotive

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market.

By Technology

Active Torque Vectoring Systems (ATVS) are advanced, electronically controlled systems that actively and dynamically manage torque distribution to individual wheels based on real-time driving conditions. Using a combination of sensors, onboard computers, and sophisticated algorithms, ATVS continuously assess factors such as wheel speed, steering input, throttle position, and vehicle dynamics. By selectively braking or accelerating specific wheels, ATVS enhances cornering performance, minimizes understeer or oversteer, and improves overall stability. The active nature of ATVS allows for instantaneous adjustments, making it well-suited for high-performance vehicles and those requiring precise control in various driving scenarios. Manufacturers often integrate ATVS into broader Advanced Driver Assistance Systems (ADAS) for a comprehensive approach to vehicle safety and performance.

Passive Torque Vectoring Systems (PTVS) operate without active electronic control and instead rely on mechanical or hydraulic mechanisms to distribute torque among the wheels. PTVS typically employs limited-slip differentials, mechanical couplings, or other mechanical components to achieve torque distribution based on simple and predetermined mechanical principles. While less complex than ATVS, PTVS can still effectively enhance vehicle dynamics, especially during cornering. PTVS solutions are often more cost-effective, and their simplicity can be advantageous for certain vehicle applications. However, they may not offer the same level of adaptability and responsiveness as ATVS, making them more common in mainstream or entry-level vehicles where precise torque vectoring may be less critical.

The choice between ATVS and PTVS often depends on factors such as the intended use of the vehicle, cost considerations, and the desired level of performance. Performance-oriented and high-end vehicles may prioritize the sophistication and adaptability of ATVS, while more budget-conscious or utility-focused vehicles may find the mechanical simplicity of PTVS sufficient for their requirements. As the torque vectoring market continues to evolve, advancements in both ATVS and PTVS technologies are likely, driven by ongoing innovations in automotive engineering and the pursuit of enhanced vehicle dynamics and safety.

Regional Insights

North America, the torque vectoring market is driven by a combination of factors,

including a strong demand for high-performance vehicles, the prevalence of advanced driver assistance systems (ADAS), and a growing emphasis on vehicle safety. The market is influenced by the preferences of consumers for SUVs and trucks, where torque vectoring can enhance off-road capabilities. Regulatory standards and the push for more fuel-efficient and environmentally friendly vehicles also play a role in shaping the torque vectoring landscape.

Europe has been a prominent market for torque vectoring technology, particularly given the region's affinity for high-performance and luxury vehicles. The stringent emission standards and the European automotive industry's commitment to technological innovation have driven the integration of torque vectoring systems. Additionally, the demand for improved handling and stability in various driving conditions, including challenging mountainous terrains, contributes to the adoption of torque vectoring in this region.

The Asia-Pacific region, with its rapidly growing automotive market, is witnessing increased adoption of torque vectoring technology. The market is influenced by the rise of electric vehicles, advancements in automotive technology, and the growing middle class with an increasing affinity for premium and performance-oriented vehicles. In countries like Japan and South Korea, where automotive innovation is a focal point, torque vectoring systems are becoming integral to enhancing vehicle dynamics.

Latin America exhibits a varied market landscape for torque vectoring, influenced by economic factors, consumer preferences, and regulatory conditions. The demand for torque vectoring systems is often linked to the popularity of certain vehicle segments, with potential growth in the market as consumers seek enhanced driving experiences and safety features.

In the Middle East and Africa, the torque vectoring market may be influenced by the preferences for off-road vehicles and luxury models. The demand for torque vectoring systems could be driven by the need for improved stability and control in diverse terrains, as well as the desire for advanced driving features in premium vehicles.

Regional variations in infrastructure development, consumer preferences, and regulatory environments contribute to diverse trends in the torque vectoring market across different parts of the world. As the automotive industry continues to evolve, these regional insights may shift, and new factors may emerge, influencing the adoption and development of torque vectoring technology.

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Key Market Players

Univance corporation

Eaton Corporation

Bosch Ltd

GKN Automotive Limited

American Axle & Manufacturing, Inc.

Continental AG

BorgWarner

ZF Friedrichshafen AG

Dana Incorporated

Jtekt corporation

Report Scope:

In this report, the Global Torque Vectoring Market has been segmented into the following categories, in addition to the industry trends which have also been detailed below:

Torque Vectoring Market, By Propulsion:

Front Wheel Drive (FWD)

Rear Wheel Drive (RWD)

All Wheel Drive/Four Wheel Drive (AWD/4WD)

Torque Vectoring Market, By Technology:

Active Torque Vectoring System (ATVS)

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Passive Torque Vectoring System (PTVS)

Torque Vectoring Market, By Vehicle Type:

Passenger Cars

Light Commercial Vehicles

Heavy Commercial Vehicles

Torque Vectoring Market, By Region:

North America

United States

Canada

Mexico

Europe & CIS

Germany

Spain

France

Russia

Italy

United Kingdom

Belgium

Asia-Pacific

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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 presents in the Global Torque Vectoring Market.

Available Customizations:

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Global Torque Vectoring 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).

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