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# In-wheel motor Market Research Report—Global Forecast till 2030

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**Description:** The Global in-wheel motor market is projected to be worth USD 28076.64 million by 2030, registering a CAGR of 32.31% during the forecast period (2022–2030).

## In-wheel motor Market Overview

The in-wheel motor is a type of an EV drive system. These motors are mounted directly on the wheels to power the wheel by directly supplying the torque to the respective tires. This type of motor reduces the weight and improves the efficiency of the vehicle. These motors also allow torque vectoring—the application of different torques to different wheels that can improve handling.

## COVID-19 Impact on the Global In-wheel motor Market:

The outbreak of COVID-19 initially in China's Wuhan and later across the globe caused several disruptions in the industry. In 2020, the automotive technology and components industry reported a decrease in global sales and delayed production capabilities, owing to the rapid spread of the deadly novel coronavirus that forced governments to impose movement restrictions, adopt the work from remote environments, follow social distancing & other hygiene practices at public places, and shut down of production & sales facilities. This has resulted in the piled-up inventories for the automotive supply chain and scarcity of electronic components that impacted the pricing strategies. This was further impacted by the slump in consumer demands.

The COVID-19 pandemic resulted in the lockdown of manufacturing, commercial, and industrial facilities that delayed the production schedules raising the inventories and financial losses. Additionally, the dependence on automotive sales and production directly impacts the revenue generation of electric vehicles. However, the sales of EVs in the initial days of the pandemic dropped but recovered soon with the relaxations in the movement and lockdown policies from the government authorities.

## In-wheel motor Market Dynamics

### Drivers

- **Government initiatives to encourage adoption of electric commercial vehicles**
- **Expansion of global electric vehicle manufacturers into emerging markets**

The governments and respective state governments of various countries are taking certain initiatives to increase the awareness about using electric commercial vehicles to control the adverse impact on the environment and foreign exchange reserves. For instance, the International Council on Clean Transportation is working with the Zero Emission Vehicle regulation, progressive electric utility policies, greater model availability & marketing, consumer rebates, access to carpool lanes on congested highways, extensive electric vehicle charging infrastructure, access to high-occupancy vehicle lanes, and continued growth of local electric vehicle promotions. This is as the crude oil prices are continuously increasing.

The electric vehicle reduces the amount of noise and pollution generated compared to conventional vehicles. Commercial vehicles offer opportunities for more transport work at night, thus reducing the burden on the roads during the day. Therefore, many electric vehicle manufacturing companies are investing in product development to cater to the increasing demand from customers.

### Restraints

- **High prices of electric vehicles**
- **Limited capacity of batteries**

The growth of the global in-wheel motor market primarily depends on the adoption of electric commercial vehicles among medium and large fleet owners. The high price of a commercial electric vehicle and its accessories is the most important factor of concern for fleet owners. The most important concerns of electric commercial vehicle buyers are their battery prices, battery range, and battery life as the current battery capacity of the heavy-duty commercial vehicle falls short of the requirements for long-haul trucking applications, which prevents the use of electric commercial vehicles outside fixed regional routes. Although battery prices have been declining in recent years, electric commercial vehicle manufacturers are still struggling to make an affordable and dependable alternative for ICE commercial vehicles in most applications.

The need to replace the battery within a span of one to two years restricts the adoption of in-wheel motors in electric commercial vehicles. Additionally, their long charging time, safety, and security concerns regarding battery explosion in extreme weather and operating conditions have also been restricting the adoption of in-wheel motors. Thus, the impact of the limited capacity of batteries on the global in-wheel motor market is expected to shift from high to low over the forecast period.

### **Opportunities**

- **Increasing logistic activities**

The logistics & transportation industry in the US is highly competitive. The rapid increase in e-commerce sales is driving changes in the logistics industry. As per the US Department of Commerce, in 2020, total US e-commerce sales reached USD 787.9 billion, a 32.3% year-over-year increase from 2019's USD 595.7 billion. The growth in e-commerce has resulted in a higher volume of low-value shipments. In response, retailers are increasingly decentralizing their distribution centers and establishing the "last-mile" fulfillment centers to keep inventory closer to consumers. This increases the demand for electric commercial vehicles for transporting the inventory to the closer distribution centers with zero emissions surely.

One of the greatest advantages of using in-wheel electric motors is the fact that the power goes straight from the motor directly to the wheel. Reducing the distance, the power travels increase the efficiency of the motor. This shows the increasing logistic activities and the demand for in-wheel motors in electric commercial vehicles to fulfill these logistic activities. Thus, the increasing logistic activities are expected to create lucrative opportunities for the players operating in the global in-wheel motor market.

### **In-wheel motor Market Supply Chain Analysis**

In the design and development stage, the dimensions, technology, working conditions, battery capacity, cooling type, vehicle type, motor type, and applications of the in-wheel motors are analyzed to design and develop in-wheel motors that fulfill the requirements of the customers. In the design stage, the overall layout, components, material type, size, and shape of the in-wheel motors are determined according to their application and the specific requirements of the end users. The development stage includes developing an initial prototype and its testing phase, which is done under various working conditions for ensuring efficient product performance throughout the entire lifespan of an in-wheel motor. After finalizing the design, the various raw materials, such as silicon steel, copper, and aluminum are selected. Some of the components required for manufacturing an in-wheel motor are rotors, stators, and protective cover. An uninterrupted supply of high-quality raw materials and components in the required quantity not only warrants the longevity of the final products but also affects their efficiency.

Additionally, the functionality, price in the aftermarket, and lifespan of the in-wheel motor are entirely dependent on the quality of the raw materials and components. After procuring the necessary raw material and components, the OEM assemble the in-wheel motor according to the design, which was finalized by keeping in mind the customer's requirements. After the assembly stage is completed, the finished in-wheel motors undergo certain quality checks to ensure that they comply with the required performance standards and work with precision and efficiency in actual working conditions. After the assembly stage is completed, the finished products are sent to various distributors and suppliers, such as independent dealers and company dealers who work as channels to provide the final in-wheel motors to the end users. Such supply channels provide finished products to fleet owners, distributors, individual buyers, and government organizations.

The primary end users in the global in-wheel motor market are individual buyers, fleet owners, logistics service providers, and government organizations. The end user purchases in-wheel motors from the dealers. The selection of the in-wheel motor is primarily dependent on their working conditions, specifications, battery capacity, vehicle type, cooling type, aftersales service, and cost. The selection is further dependent on their applications, to which the vehicle would be subjected.

### **In-wheel motor Market Segmentation**

**Based on Propulsion type:**

BEV, PHEV and FCEV are the segments based on the application of the Global In-wheel motor Market. The BEV segment is expected to have the highest CAGR and dominate the market share during the forecast period. Battery electric vehicles (BEVs) generally use chemical energy, which is stored in rechargeable battery packs. The battery-powered electric vehicles use motor controllers and electric controllers instead of using internal combustion engines and get the power from battery packs. As a result, BEVs are energy efficient, produce fewer greenhouse gases, do not create any noise, and pollute less than internal combustion engine vehicles. Over the last few years, battery-operated commercial vehicles have gained momentum globally, especially in the US market. Major electric commercial vehicle manufacturing companies enhance the battery capacity and involve less charging time.

**Based on Cooling type:**

Air cooling and Liquid cooling are the segments based on the application of the Global In-wheel motor Market. The Liquid cooling segment is expected to have the highest CAGR and dominate the market share during the forecast period. Liquid cooling is the most common method among electric vehicles. In this method, the water flows into a jacket installed in the housing and exchanges generated heat. As a result, it achieves better cooling uniformity and less system cost than oil cooling. However, its cooling performance is not as effective as that of oil cooling.

**Based on Motor type:**

Axial flux motor, and Radial flux motor are the segments based on the application of the Global In-wheel motor Market. The Axial flux motor segment is expected to have the highest CAGR and dominate the market share during the forecast period. The axial flux motor is a suitable alternative to the traditional radial flux motor due to its compact structure. This motor is suitable for in-wheel applications so that the transmission gear can be suppressed. Furthermore, as a vehicle's motors often work in variable-speed conditions, the prediction of vibrations and noise of electric motors over a broad speed range is usually necessary, provided by axial flux motors.

**Based on Power Output:**

60 kW, 60–90 kW, and Above 90 kW are the segments based on the application of the Global In-wheel motor Market. The 60–90 kW segment is expected to have the highest CAGR and dominate the market share during the forecast period. The 60–90 kW output power range for the in-wheel motor is the maximum range used in the motors. Elaphe offers M700 motor, a highly compact high-torque in-wheel motor designed to fit inside a standard 15- or 16-inch rim. It has over 700 Nm of peak torque, 75 kW of peak power, and 50 kW of continuous power, in a wide range of passenger cars. Some of the other companies which provide motors in this power range are Printed Motor Works, NTN Corporation, and Protean Electric.

**Based on Vehicle type:**

Passenger cars and commercial vehicles are the segments based on the application of the Global In-wheel motor Market. The passenger cars segment is expected to have the highest CAGR and dominate the market share during the forecast period. Passenger cars are among the top contributors to the electric vehicles industry. This was mainly attributed to the government initiatives to enhance the adoption of electric vehicles among the large consumer base while shifting from traditional ICE vehicles to carbon-neutral mobility solutions such as electric cars. Additionally, the governments are also strategizing to minimize the crude oil imports that incur high expenditure. Furthermore, the rise in awareness of EVs that provide low-cost mobility compared with their ICE-based vehicles adds to the market growth. As a result, luxury car manufacturers are investing mainly in R&D efforts to enhance the range of distance covered by EVs while minimizing the overall cost of car ownership.

**In-wheel motor Market Regional Analysis**

The regions are classified as North America, Europe, Asia-Pacific, Middle East & Africa, and South America. Asia-Pacific is estimated to hold the highest revenue for In-wheel motor market share throughout the forecast period. The demand for commercial electric vehicles in Asia-Pacific is expected to grow significantly due to the growing demand for electric buses and the initiatives to promote the development of electric vehicles taken by the governments of countries such as China, Japan, and India. Furthermore, the rising demand for the development of charging infrastructure and increasing collaborations between the automotive OEMs in the region results in the market's growth in this region.

Europe has seen significant growth towards EV adoptions. The European Union's new emissions standard—95 grams of carbon dioxide per kilometer for passenger cars—has also boosted EV sales as it stipulates that 100% of the fleet must meet this standard in 2021. In addition, incentive boosts by green recovery funds, more attractive EV model choices from top brands, such as Daimler AG, BMW, and Volkswagen, increased availability, and intense promotion of EVs in the region have also helped spur consumer-side demand. Another boost to the growing electric vehicle market is the commitment from Ford Motor Company to launch an all-electric vehicle line-up by 2030 in the European region. The company aims to launch its first full-line passenger EV in 2023 and then

onwards to launch every vehicle to be sold in Europe to be either an EV or a plug-in hybrid (PHEV) by 2026.

### **In-wheel motors Market Competitive Landscape**

The global in-wheel motor market is characterized by the presence of many local, regional, and global vendors. The In-wheel motor market is highly competitive, with all the players continually competing to gain a larger market share. High competition, rapid advances in technology, frequent changes in government policies, and stringent environmental regulations are some of the critical factors that could restrain the market growth. The vendors compete in terms of cost, product quality, reliability, and aftermarket services. Vendors must provide cost-effective and efficient products to survive and succeed in a competitive market environment.

### **List of Key Companies covered in the in-wheel electric motor market report:**

- Protean Electric (US)
- NTN (Japan)
- NSK (Japan)
- Printed Motor Works (UK)
- Elaphe Ltd. (Slovenia)
- Ziehl-Abegg (Germany)
- e-Traction (Netherlands)
- DANA TM4 (Canada)
- Ecomove (Denmark)
- TAJIMA EV (Japan)
- YASA (UK)
- Schaeffler (Germany)

### **Recent Developments:**

- In June 2021, e-Traction partnered with ViriCti, to help accelerate the adoption of electric buses by using the state-of-art The Motion 2.0 drivetrain.
- In February 2021, Tajima Motor Corporation Idemitsu Kosan partnered with Corporation to build and market mini electric vehicles that can travel as fast as 60 kilometers per hour.
- In January 2021, National Electric Vehicle Sweden (NEVS), a subsidiary of Evergrande Health, has acquired Protean Electric, a leading developer of in-wheel motor technology. The acquisition is part of Evergrande's strategy to become a major player in the global electric vehicle (EV) industry.
- In May 2019, Elaphe Ltd. Has announced they have begun low-volume series manufacturing of the world's highest performance direct drive, gearless in-wheel powertrain system, called the L1500.
- In September 2018, Printed Motor Works, resigned and enhanced the specification of its compact XR15 series in-wheel motor range. The upgraded models have greater radial and axial load bearing capacity.

### **In-wheel motor Market Report Overview:**

The Global In-wheel motor Market is segmented based on Cooling Type, Motor Type, Vehicle Type, And Power Output in this report. The report is focused on various analytical aspects such as market dynamics, Supply chain analysis, Porter's five forces, competitive landscape, recent developments, and company profiles. The insights in this report, comprise, discuss views, and predict the emerging and fast-growing segments, regions, and countries with potential for development in the Global In-wheel motor Market.

## **Automotive In-wheel motor Market Segmentation Overview:**

### **By Propulsion type:**

- BEV
- PHEV
- FCEV

### **By Cooling type:**

- Air cooling
- Liquid cooling

### **By Power output:**

- Up to 60 kW
- 60–90 kW
- Above 90 kW

### **By Vehicle type:**

- Passenger Cars
- Commercial Vehicles

### **By Regions:**

- North America
- Europe
- Asia-Pacific
- Middle East & Africa
- South America

## **Objectives of the Study**

- To get a comprehensive overview of the Global in-wheel motor market.
- To get wide-ranging information about the key factors driving the market and market opportunities
- To gain information regarding the key players in the industry, technology advancements and key developments
- To gain insights about the key country/region in which the in-wheel motor market is growing

## **Intended Audience**

- Automobile Companies
- Manufacturing Companies
- Research Institutes
- Academic Institutes
- Government Organizations

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