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Opportunities of Wind Power Fasteners in China

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Introduction

China has become the undisputed leader in global wind power. By the end of 2024, its installed wind capacity exceeded 520 GW, accounting for more than one-third of the world's total. Offshore projects have expanded particularly fast, reaching nearly 40 GW, making China the largest offshore wind market worldwide. As the country pushes toward its carbon neutrality target by 2060, this momentum will only intensify.

Behind every turbine stands a vast ecosystem of industrial suppliers. Among the most critical yet often overlooked components are fasteners, bolts, nuts, studs, and other elements that hold together towers, nacelles, and blades. Their performance directly affects the stability, safety, and service life of wind installations. For China, which already commands a strong industrial fastener base, this presents a major growth opportunity in both domestic and export markets.

Wind Power Growth in China and Its Implications for Fasteners

By late 2024, China had surpassed 520 GW of wind power capacity, reinforcing its position as the world's largest market. Offshore wind alone grew from less than 5 GW in 2018 to nearly 40 GW in 2024. This rapid expansion means demand for specialized fasteners has surged.

Each utility-scale turbine requires thousands of fasteners, many of which must withstand extreme vibration, high mechanical loads, and harsh weather conditions. As turbines increase in size, with offshore models now exceeding 15 MW, fasteners must be larger, stronger, and equipped with advanced coatings to prevent corrosion. These requirements elevate the sector from a commodity market to a field of highly engineered, high-value components.

Global Wind Power Fasteners Market and Asia-Pacific Leadership



The global wind power fasteners market has grown in lockstep with the rapid expansion of wind energy capacity worldwide. Fasteners are critical to the structural performance of turbines, ensuring that towers remain stable, blades securely attached, and nacelles properly aligned. As turbine designs evolve and offshore projects scale up, the demand for advanced fasteners is increasing significantly.

According to industry research, the global wind power fasteners market was valued at USD 5.2 billion in 2023 and is forecast to reach USD 8.7 billion by 2032, registering a CAGR of 6.5%. This growth reflects both the sheer scale of new wind installations and the rising technical requirements for components.

- **Demand drivers:** Over 127 GW of new wind capacity was added globally in 2024 alone, an all-time record, with more than 23,000 turbines installed. Each turbine requires tens of thousands of fasteners, many of them oversized or customized for structural applications.
- **Technical shift:** As turbines surpass 15 MW capacity offshore, the size and grade of fasteners must increase accordingly. Larger diameters, higher strength classes, and advanced coatings are now the industry norm.
- **Offshore premium:** Offshore installations represent the fastest-growing segment of the wind industry. They require marine-grade bolts, studs, and nuts with anti-corrosion coatings that can endure saltwater and humidity for decades.

Geographically, the Asia-Pacific region leads the market, accounting for the largest regional share. China dominates installations, representing more than one-third of global wind capacity. This leadership translates into unmatched demand for wind fasteners, both for onshore and offshore projects.

With its vast industrial production base, China is uniquely positioned to not only supply its own projects but also shape the global supply chain of wind-certified fasteners. The combination of large-scale demand, advanced engineering requirements, and export potential underscores why Asia-Pacific, and China in particular, sits at the center of the global market for wind fasteners.

Opportunities in the Chinese Market

- a) Industrial base:** China's overall industrial fastener market exceeded USD 12 billion in 2024, projected to double by 2032. With strong manufacturing capabilities, the transition toward higher-value fasteners tailored for wind applications offers significant margin expansion.
- b) Offshore wind growth:** With nearly 40 GW of offshore capacity already installed, China is the world's largest offshore wind market. Offshore turbines, operating in corrosive marine environments, require advanced coatings and materials. Demand for marine-grade bolts, studs, and nuts will grow rapidly as more projects move from planning to construction.
- c) Technical innovation:** Next-generation turbines demand longer, stronger bolts and advanced coatings such as Dacromet and hot-dip galvanization. High-strength grades (8.8–12.9) and oversized diameters (20–42 cm) are increasingly becoming standard. This creates opportunities for suppliers capable of producing specialized products with consistent quality and certification.
- d) Export potential:** As Chinese turbine manufacturers expand globally, they are creating export channels for domestic fastener suppliers. International certification and compliance with ISO and IEC standards will be essential for success in these markets.

Challenges and Barriers



While opportunities are vast, the sector faces significant challenges that must be addressed to ensure sustainable growth. Wind power fasteners operate under some of the harshest conditions in the industrial sector. They must resist constant vibration, cyclic fatigue, and in offshore projects, severe marine corrosion. These requirements raise the stakes for quality control and standardization.

Another challenge is cost volatility. Steel and alloy prices fluctuate widely, squeezing margins for manufacturers. At the same time, pressure from turbine OEMs to lower component costs often conflicts with the need for higher-quality fasteners. **Balancing price competitiveness with durability and compliance is a delicate challenge for suppliers.**

Finally, maintenance and logistics remain problematic. Turbines are often located in remote inland regions or offshore waters, where replacing defective fasteners is difficult and costly. This underscores **the need for products that minimize replacement cycles and extend service life.**

Key barriers include:

- Cost pressures from raw material fluctuations.
- Lack of uniform standards and certification among smaller suppliers.

- Harsh operating environments that complicate installation and maintenance.

Key Opportunity Areas

Despite these barriers, the market holds strong opportunities for players that innovate and align with evolving industry needs. The most promising areas are linked to offshore wind expansion, the growing size of turbines, and the global trend toward higher engineering standards.

Chinese manufacturers, already experienced in producing industrial fasteners at scale, can capture premium value by focusing on specialization rather than volume. By developing advanced coatings, larger-diameter bolts, and even smart monitoring solutions, they can establish leadership not only domestically but also globally.

Segment	Opportunity
High-strength bolts & studs	Required for oversized turbines, fatigue-resistant and certified.
Offshore applications	Rising demand for marine-grade fasteners with advanced anti-corrosion coatings.
Coating technologies	Development of zinc-aluminum, ceramic, or polymer coatings to extend lifespan.
Export channels	Aligning with ISO/IEC standards to supply international wind projects.
Smart fasteners	Sensor-enabled fasteners to monitor stress and loosening in real time.

Outlook and Strategic Guidance



The outlook for wind power fasteners in China is highly positive, but success will depend on moving beyond commodity production. The opportunity lies in engineering excellence, certification, and integration into global supply chains.

Strategic recommendations for market players include:

- **Shift up the value chain:** Focus on high-performance products for utility-scale and offshore turbines rather than generic fasteners.
- **Invest in R&D:** Explore new alloys, advanced coatings, and even smart monitoring systems to meet evolving demands.
- **Prioritize certification:** Compliance with ISO, DIN, and IEC standards will open both domestic mega-projects and export opportunities.
- **Build partnerships:** Collaborate closely with turbine OEMs and EPC contractors to secure long-term supply agreements.

China's ambition in renewable energy ensures that demand for wind fasteners will grow steadily through the next decade. For suppliers willing to innovate, specialize, and internationalize, the sector represents one of the most dynamic and profitable opportunities in the industrial fastener industry today. ■

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