Efficient and safe hydraulic bolting for the wind industry

As wind energy continues to grow, the need for efficient and safe turbine maintenance becomes more urgent. Service teams face numerous challenges, including difficult access to turbine components and the need for reliable, high-torque tools.

The expansion of wind power is a critical element in the global transition toward renewables. Governments worldwide, including Germany, have set ambitious targets for increasing the capacity of wind energy. To meet these goals, the construction of wind turbines is being accelerated, which places increasing demands on the service departments of turbine manufacturers and specialized service providers.

As the scale of wind energy infrastructure grows, the need for efficient, safe, and cost-effective maintenance solutions becomes more pressing. Wind turbines are complex, high-performance systems that require regular maintenance to ensure operational reliability and structural integrity. One of the most critical aspects of turbine maintenance is the inspection and securing of bolted connections, which are subjected to extreme mechanical stress during operation.

Plarad, a leading provider of bolting technology, has introduced a groundbreaking solution tailored to the specific needs of the wind industry: the XA1 Power battery-powered hydraulic unit. This innovative tool is designed to simplify bolting operations in challenging wind turbine environments, increasing safety and efficiency for service teams working at height and in confined spaces.

The growing challenge of wind turbine maintenance

Wind turbines operate under highly demanding conditions. Constant exposure to varying wind loads, temperature fluctuations, and environmental stress leads to wear and tear on mechanical and electrical components. To maintain structural integrity and performance, critical components such as rotor blades, hubs, tower segments, and foundations require routine inspection and maintenance.

Bolted connections play a crucial role in transferring loads within the turbine structure. These connections must withstand extreme mechanical stress, including torque from high winds and rotational forces from the turbine's blades. Over time, bolts can loosen or degrade, leading to structural instability or operational failure. Therefore, regular tightening and replacement of bolted connections is essential to maintain the safety and reliability of the turbine.

Service technicians are tasked with checking and securing these bolted joints during routine maintenance. This process often requires accessing difficult-to-reach areas within the nacelle, hub, or tower, sometimes under adverse weather conditions and at significant heights.

Wind turbine service teams face a unique set of logistical and operational challenges. One of the primary difficulties is the remote and hard-to-reach locations where turbine components often need maintenance. These components are typically situated high above the ground or in confined spaces within the nacelle or tower.

Another challenge is the limited access to a power supply. Service teams often work in areas where there is no direct access to an electrical power source, complicating the maintenance process. Additionally, heavy equipment, such as traditional hydraulic units, is often required. These units can weigh between 30 kg and 40 kg, making it physically demanding and time-consuming to transport them to the top of a turbine or through narrow access points.

Safety is also a significant concern. Power cables from conventional hydraulic units create trip and fall hazards, particularly in confined spaces or under poor lighting conditions. Finally, the time and effort required to transport equipment and set up for bolting work directly impact both the cost and efficiency of maintenance operations, leading to increased downtime.

The increasing size and complexity of modern wind turbines only magnify these challenges, making it essential to find more efficient and user-friendly solutions.

The need for a smarter, lighter solution

To improve the efficiency and safety of wind turbine maintenance, service teams need tools that are lightweight and easy to transport, independent of external power sources, and reliable enough to deliver high torque. These tools must also be safe to use in confined or elevated work areas and fast and easy to operate.

The new XA1 Power battery-powered hydraulic unit has been designed specifically to address these needs, offering a combination of lightweight construction, high performance, and operational flexibility.

A breakthrough for the wind industry

The XA1 Power is a game-changer in the field of bolting technology. Weighing just 10 kg, including the batteries, it is significantly lighter than traditional hydraulic units, which typically weigh between 30 kg and 40 kg. This weight reduction makes it easier for technicians to transport and handle the unit, especially when working at height or in confined spaces.

The tool is battery-powered, allowing it to operate independently of external power sources, which makes it ideal for use in remote locations and offshore environments. It has a high torque capacity, supporting hydraulic wrenches with working pressures up to 800 bar and delivering torque levels up to 150,000 Nm. The battery life is impressive, with a single charge providing enough power for up to 170 bolting cycles under typical operating conditions.

Additionally, the tool features wireless operation with a remote control, giving technicians full control of the bolting process from a safe distance. Built to endure harsh environments, it is compact yet robust, designed with durable construction to withstand tough working conditions.

Enhanced mobility and safety

The XA1 Power's lightweight design makes it easy to transport and set up in the nacelle or on the tower. Since it operates on battery power, there are no cables involved, which significantly reduces the risk of tripping or accidental disconnection.

The wireless remote control adds to the unit's operational flexibility, allowing technicians to adjust torque settings and monitor performance without needing to be physically close to the unit. This improves both safety and efficiency, especially in challenging environments such as offshore wind farms.

A complete bolting solution

A fully integrated bolting solution has been developed by pairing the XA1 Power with the DA2 battery-powered hydraulic wrench. The DA2 is engineered to deliver high torque output with precision and ease of use.

The ergonomic design of the DA2 reduces operator fatigue, while its high-capacity battery ensures long-lasting performance. The combination of the XA1 Power and the DA2 creates a self-sufficient bolting system that meets the unique demands of the wind industry.

Why it matters for wind turbine maintenance

The lightweight design of the tools reduces setup time, enabling technicians to begin work more quickly and cut down on overall maintenance time. With no cables involved, the system minimizes trip hazards, significantly improving operator safety.

The XA1 Power's high torque capacity ensures consistent performance, allowing bolted connections to be tightened to precise specifications, which enhances structural integrity and lowers the risk of failure. The system is also versatile, making it suitable for both onshore and offshore wind farms, regardless of local voltage or frequency standards.

Transforming maintenance operations

The XA1 Power battery-powered hydraulic unit represents a significant advancement in bolting technology for the wind industry. By combining high torque capacity with lightweight design and independent operation, a solution has been created that addresses the specific challenges of wind turbine maintenance.

Service teams can now perform bolting tasks more quickly and safely, even in difficult working environments. The reduction in equipment weight and the elimination of cables improve mobility and operator safety, while the long battery life ensures consistent performance across multiple bolting cycles.

Supporting the future of wind energy

As the global wind energy sector continues to grow, the demand for reliable, efficient, and safe maintenance solutions will only increase. This innovative bolting technology is helping to support this growth by providing service teams with the tools they need to work more efficiently and safely in the field.

By introducing these tools Plarad has reinforced its position as a leader in bolting technology and a key partner for the wind industry. The XA1 Power and DA2 represent the future of bolting, lighter, faster, and more efficient, helping to keep the world's wind turbines turning.

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