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Revolutionizing lifting with heavy lift slings

As the wind energy industry continues to grow, so does the technology that supports it. One area of innovation is heavy lifting solutions, where traditional steel wire ropes and chains are being replaced by safer, more efficient alternatives. Among the pioneers of this movement is Extreema® Softslings, which is setting new benchmarks for lifting equipment used in wind turbine installation, maintenance, and logistics.

The challenge of lifting in wind energy

The rise of onshore and offshore wind farms, with their increasingly large and complex turbines, has pushed the boundaries of lifting equipment. As turbines grow taller and blades become longer, the loads involved become more substantial, necessitating specialized lifting gear capable of safely handling these massive components. Wind turbine parts like nacelles, blades, and tower sections are not only heavy but also fragile, requiring equipment that provides precise control to minimize damage.

Wind farm construction often takes place in harsh environments with limited access, increasing the complexity of lifting operations. Onshore wind farms are typically situated in rugged terrain, such as hills, mountains, or forests, making access difficult for transporting heavy lifting equipment. Additionally, lifting large and heavy components to significant heights can complicate the lifting process.

Offshore wind farms present even more demanding conditions for lifting operations. The installation of wind turbines in the open ocean involves dynamic environments characterized by strong winds, wave motion, and saltwater exposure. Offshore lifting operations typically take place from vessels or platforms with limited deck space, requiring precise and safe handling of equipment.

Traditional steel slings have several disadvantages in these contexts, such as their weight, inflexibility, and the risk of causing surface damage to turbine components. These challenges have driven the search for innovative alternatives that can deliver equal or greater strength and safety while overcoming the limitations of traditional lifting gear. Enter Extreema® Softslings, a revolutionary solution designed to meet the unique demands of the wind energy sector.

Limitations of traditional equipment

In wind turbine installations, both onshore and offshore, traditional steel ropes present several challenges. Their weight complicates handling, increases the risk of damaging components, and makes them particularly susceptible to corrosion in offshore environments. These limitations not only complicate logistics but also increase maintenance needs and slow down installation processes.

In contrast, soft slings, such as Extreema® Softslings made from Dyneema®/HMPE, offer significant advantages over traditional steel wire ropes and chains in terms of weight, strength, and flexibility, making them especially suitable for wind turbine installations. Soft slings are 80 to 90% lighter than steel ropes and chains with equivalent lifting capacities. This lightweight nature simplifies handling, transportation, and rigging, thereby reducing strain on workers and lifting equipment.

Despite being much lighter, soft slings possess a high strength-to-weight ratio that matches or exceeds the lifting capacity of steel. Made from durable fibers like Dyneema®/HMPE, they can handle heavy loads while remaining resistant to abrasion. Steel ropes achieve similar strength only with thicker, bulkier sizes, which are more rigid and prone to fatigue.

Soft slings are highly flexible, conforming easily to irregular shapes, such as wind turbine blades, without causing damage. Their ability to wrap snugly around loads ensures a secure grip. In contrast, steel ropes are rigid and can damage sensitive components, necessitating extra protective measures. This flexibility allows for a better ratio of the sling's diameter to the load's diameter, known as D/d ratio. Which means softer bends and less stress on both the sling and load.

Softslings technology

Extreema® Softslings are crafted with cutting-edge parallel-laid fiber technology, forming the essence of their core, unlike braided ropes. This means the load-bearing fibers inside the sling are aligned parallel to each other along the length of the sling. This arrangement maximizes the strength of the fibers so the load is evenly distributed across all fibers.

At its core, Softslings is a highly specialized type of synthetic lifting sling designed to handle extreme loads while being lightweight, flexible, and damage-resistant.

Dyneema®/HMPE fibers are approximately 15 times stronger than steel on a weight-for-weight basis and is a certified material by DNV-GL, further attesting to its reliability and performance. This remarkable strength allows the slings to achieve high lifting capacities with significantly less bulk. Also, these fibers are highly resistant to abrasion and cutting, ensuring durability in demanding lifting environments.

Resistance to environmental factors

Soft slings made from Dyneema®/HMPE possess several properties that make them ideal for use in harsh environmental conditions. They offer corrosion resistance, unlike steel, making them ideal for offshore applications where exposure to saltwater is common. The fibers are also resistant to chemicals such as oils, fuels, and solvents, allowing the slings to maintain their integrity even in industrial environments.

The fibers also have good UV resistance, which can be further enhanced with additional coatings or sleeves. Additionally, they don't absorb water, retaining strength and flexibility in wet conditions, and perform reliably across a wide temperature range.

For soft slings, a protective sleeve or cover is essential for holding the core yarn strands together. Extreema® Softslings offers various sleeve options designed for different applications, each designed to enhance preservation and durability.

The HMPE sleeve is a highly durable material widely used across various industries due to its excellent resistance against cuts, abrasions, punctures, and chemical and UV resistance. Some of the advantages of using HMPE include its high durability and stretchability, and its ability to protect the payload without causing any damage.

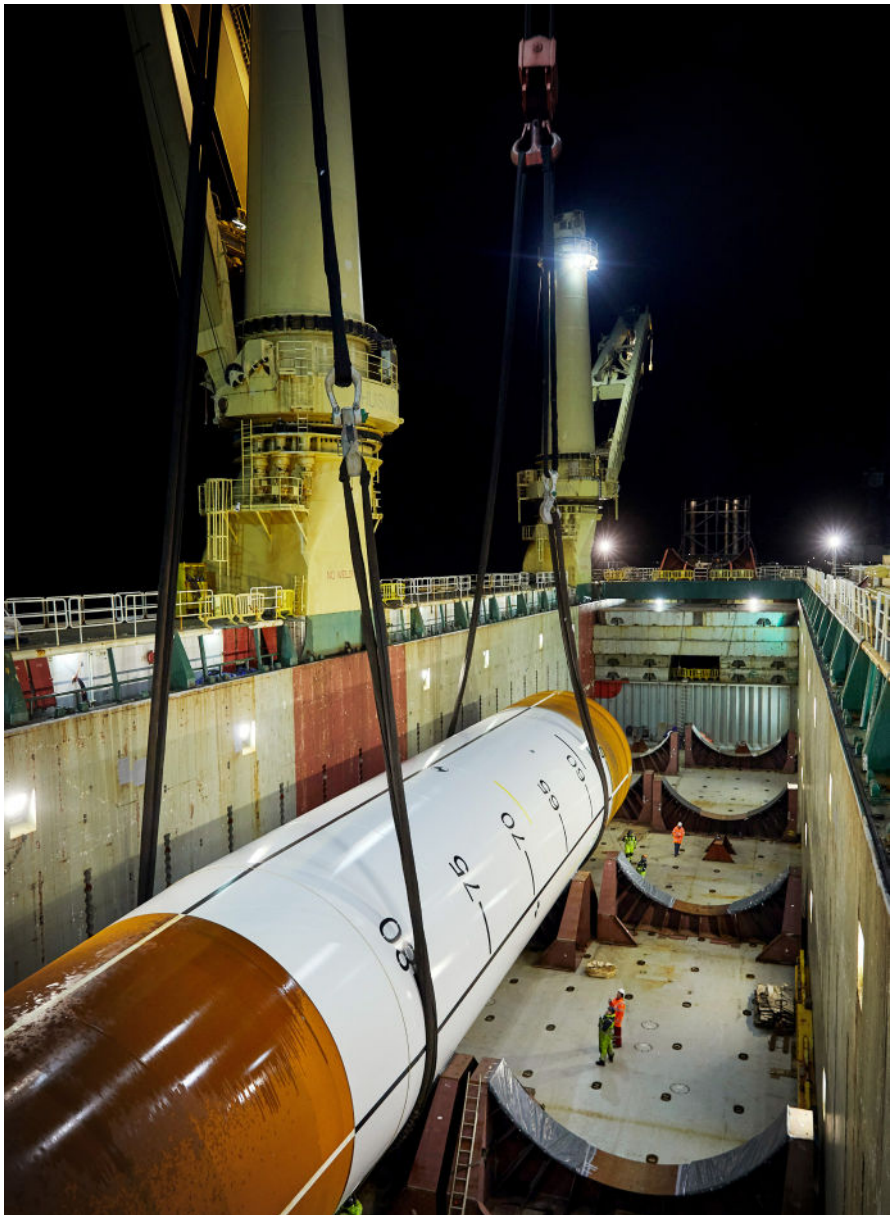
For the real heavy lifts, Extreema® Softslings use the Cordura sleeve, renowned for its exceptional resistance to abrasions, tears, scuffs, and friction (heat/pressure).

They are resistant to corrosion and can withstand harsh environmental conditions, including saltwater exposure, extreme temperatures, and UV radiation, making them perfect for offshore wind farm applications. The lightweight nature of these slings enhances safety by reducing the risk of injuries and lowering logistics costs during wind turbine assembly and maintenance.

Advantages of soft slings in the wind energy sector

Reducing damage to components

One of the most significant benefits of advanced soft slings is their ability to handle sensitive turbine components and monopiles with care. Wind turbine blades, in particular, are prone to damage during lifting due to their aerodynamic design and lightweight composite materials. Even minor scratches or dents can lead to reduced efficiency or costly repairs.



The softness and flexibility of these slings minimize the likelihood of damage, ensuring the safe handling of even the most delicate parts. Additionally, their non-abrasive surface allows for direct contact with painted surfaces, eliminating the need for protective materials like padding or rubber linings.

Improving worker safety

Wind farms, especially offshore installations, present challenging environments for workers due to strong winds and heavy equipment. Advanced soft slings contribute to improved safety by significantly reducing the physical strain on workers during installation and removal. Their ease of manipulation, particularly in tight spaces, reduces the need for excessive manpower and complex rigging setups.

Certification for heavy lifting operations

Soft slings are designed to meet or exceed industry standards for heavy lifting, ensuring safety and reliability in critical operations. Key certifications include EN 1492-4 and ASME B30.9, which outline the safety requirements for synthetic lifting slings.

The DNV GL certification, specifically DNV-ST-N001, ensures these slings are suitable for offshore and marine applications in challenging environments. Additionally, manufacturers often operate under ISO 9001-certified quality management systems, which guarantee consistent production standards.

Enhancing efficiency in offshore wind farms

Offshore wind farm construction and maintenance require lifting systems that can withstand saltwater exposure and extreme conditions. Extreema® Softslings are designed for durability, offering superior resistance to corrosion and UV degradation, meaning they last longer and require fewer replacements.

Their lightweight design significantly reduces transportation costs, especially in remote offshore locations. This weight reduction allows operators to save both time and money during the installation and maintenance of offshore wind turbines, ultimately contributing to the overall cost-effectiveness of wind energy production.

Sustainability and environmental impact

The sustainability of soft slings significantly reduces the carbon footprint in wind farm operations. Their lightweight design helps reduce fuel consumption, as lighter lifting equipment requires less energy for transport, leading to lower greenhouse gas emissions. Using smaller, less powerful cranes also reduces infrastructure strain and energy consumption.

The sleeve of Softslings can be repaired, improving its lifespan. Recycling materials like Cordura reduces the demand for new raw materials and minimizes waste, further lowering the overall environmental impact.

Streamlining logistics and reducing downtime

Efficiency is critical in the wind industry, where downtime can cause significant financial losses. By opting for advanced soft slings, wind farm operators can streamline logistics. Their lightweight nature facilitates easy transportation and handling, requiring fewer resources for loading, unloading, and rigging operations.

These slings are less prone to wear and tear, leading to a longer lifespan and reducing the need for frequent inspections and maintenance. This longevity means less downtime and more productive hours on the job.

Success stories from the wind sector

Extreema® Softslings have already proven their value in several high-profile wind energy projects. A notable example comes from the offshore wind sector in Europe, where the installation of next-generation 12 MW wind turbines posed significant lifting challenges. The monopiles for these turbines weighed over 600 tons, necessitating strong yet flexible lifting solutions.

By using Extreema® Softslings, the project team could lift and install the monopiles safely while minimizing damage to components and enhancing worker safety. In another project, these slings facilitated the transportation and installation of wind turbine blades in the North Sea, allowing for a damage-free lifting process even in challenging weather conditions.

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