Lifting keeps wind turbines turning

Words: Ross Moloney, CEO, Lifting Equipment Engineers Association (LEEA)

As the global wind industry continues to expand, safe and reliable lifting operations are essential at every stage of a turbine's life. Competent personnel, regular inspection and high standards of lifting equipment are critical to maintaining safety, minimising downtime and keeping turbines turning.

According to the Global Wind Energy Council (GWEC), 28,395 wind turbines were installed across 57 countries in 2025, adding a record 165 GW of capacity, 40% more than in 2024, which was also a record year. Wind power now generates electricity in 138 countries. By the end of 2025, global installed wind capacity had reached 1,299 GW, with GWEC projecting average annual growth of 5.2% in new installations from 2026 to 2030.

This expansion depends on the lifting industry at every stage, from manufacture and installation to inspection, maintenance, refurbishment and eventual decommissioning. With turbines designed for an operating life of around 25 years, reliable lifting equipment and competent personnel are essential to limiting downtime and maintaining safe operations.

Lifting and lashing requirements differ across tower production, load securing during transport, installation, maintenance and refurbishment. Chains, shackles, slings, clamps, lifting points and anchorage points must be selected for the task and, particularly offshore, withstand a demanding operating environment.

A wind turbine comprises a nacelle, a hub that typically carries three blades and a tower. Onshore towers may be made of concrete, while offshore towers are generally steel and supported by fixed or floating foundations.

Offshore turbines vary considerably in size and weight, depending on their design and capacity. Hub heights can exceed 100 m, while blades may be more than 60 m long. A blade and hub assembly may weigh around 22,000 kg, while a complete nacelle with a generator may weigh 52 tonnes. These examples illustrate the demands placed on lifting operations.

Installing components of this size requires specialist planning and equipment. Lifting frames and spreader beams are often needed, alongside load monitoring using load links or load pin shackles. The lifting arrangement must account for the component geometry, the load path and the conditions at the site.

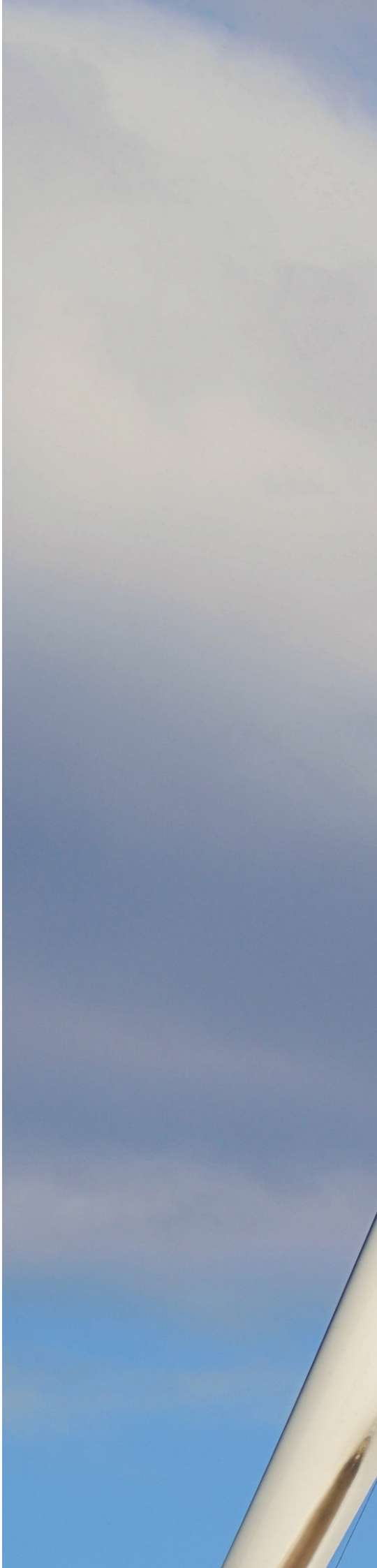
During manufacture, shackles and slings are used to position hub and nacelle components at the required angles. Monopile production also involves clamping systems to manipulate large steel plates and assemblies, sometimes in confined spaces with a single operator. These different tasks call for equipment and working methods suited to the load and available space.

Once a turbine is operational, maintenance work requires suitable anchorage points, often made from stainless steel for durability, and appropriate personal protective equipment (PPE).

Even onshore equipment can be exposed to corrosive conditions. A planned maintenance programme helps identify repairs and keep equipment in working order, while thorough examination must be carried out in accordance with applicable regulations. The programme must reflect the risks, conditions and operating environment. Inspection and maintenance are related but distinct tasks: routine upkeep does not replace the thorough examination required under the relevant rules.

The demands on service engineers

As offshore wind deployment grows, so does the need for service engineers able to work in difficult environments. Inspection and




ENO 126



Ross Moloney

maintenance may take place at heights of up to 90 m, often offshore in locations such as the North Sea, where conditions can be challenging. Alongside technical competence, engineers need the physical fitness and confidence to work safely at height and over water.

Inspection work generally involves two service engineers per turbine. In favourable conditions, a team may inspect one or two turbines in a day, although the time required varies with the weather, the condition of the assets and their age. Equipment to inspect includes service ladders, lifelines, hoists, davits, jib cranes and lifting and personnel-lifting anchorage points.

Turbine owners, operators and maintenance contractors expect a high standard of service. There is a concern within the lifting sector that competition on price could encourage some providers to reduce the time or resources devoted to inspection. A check-box approach cannot replace a thorough assessment of equipment condition and fitness for use.

Planning for safe lifting

Safety is central to installation, maintenance and inspection. Deficiencies can range from inadequate high-visibility clothing to unbalanced lifts that risk losing the load. An aborted lift wastes time and fuel, but the more serious concern is the potential harm to people and equipment.

Human factors, including carelessness, lack of knowledge and inadequate competence, can contribute to lifting accidents. Every lift requires appropriate planning, whether it is complex or relatively straightforward. Planning should take account of the load, equipment, people involved and conditions, with responsibilities understood before work begins.

Poor lifting practice can lead to accidents, regulatory investigation, compensation claims and prosecution. Those operating equipment and supervising lifts must understand the risks, but responsibility also extends to managers and directors. Safety depends on decisions made throughout the organisation, not only at the point of lifting.

Equipment failures and unsafe operations can be reduced through clear responsibilities, competent personnel and planned inspection. Lifting equipment needs attention throughout its service life, just as the turbine itself does. Regular inspection should therefore form part of the maintenance programme.

Duty holders must understand their legal responsibilities. In this context, the duty holder is the person or organisation responsible for lifting equipment in service. This may be an employer, a self-employed person, a facility owner, the person in charge of the equipment or a hire company, depending on the circumstances.

A duty holder may delegate work to qualified people or organisations where the necessary skills or knowledge are not available internally. Delegation does not remove the duty holder's responsibility; it changes how that responsibility must be discharged.

The duty holder must ensure that those undertaking lifting tasks are suitably qualified, experienced, trained and equipped. Employees and subcontractors need appropriate assessment, training and equipment for their roles. Where external organisations are engaged, procedures should be in place to assess their competence.

Competence must be demonstrated

A lack of competence can have serious consequences in lifting work, where errors may expose people to significant risks. Competence is not simply a qualification or a record of attendance on a course.

It combines practical knowledge, experience and technical understanding. People need to know what the task requires, how to carry it out safely and where the limits of their equipment and methods lie. Training is part of this, but so is the ability to apply that learning in real working conditions.

The Lifting Equipment Engineers Association (LEEA) provides training in the inspection and examination of lifting equipment, with different delivery options for trainees and employers. The association's stated aim is to eliminate accidents, injuries and fatalities across lifting and work at height. In my view, training should lead to safer behaviour, supported by competent supervision and a clear understanding of each person's responsibilities.

For wind energy operators, the practical message is to choose lifting equipment and service providers based on demonstrable competence, experience and the quality of their training, rather than price alone. Properly planned lifts, effective inspection and capable people are not optional extras. Together with the wind itself, they are what keep turbines turning.

leeaint.com