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# Safety, service, sustainability and smartness

In a growing offshore wind market, there is a need to adapt to rapid change. As wind wheels and wind farms grow in size, increasing amounts of electricity will be produced, requiring even more powerful machines, as well as cranes. That's not all though, as smart answers for complex work places and environments with diverse machines will also be needed. Those well-designed solutions will be important because crane drivers and, generally speaking, personnel on, or in charge of, platforms need to have the right tools to maintain control, no matter how multifaceted and complex the situation is.

Global offshore wind is transforming. Automation, interconnectedness and digitalization are just a few of the buzzwords longing to be filled with more concrete meaning. For example, with wind turbine development, turbine installations will go from 11 megawatts in 2021 to 20 megawatts by the end of this decade. Wind wheels of up to 30 megawatts are even predicted for the not too distant future.

However, it is not just about the scale. The challenges for cranes used for general purpose offshore include limited personnel or unmanned platforms, longer maintenance-free periods, and maintenance being expensive in relation to the work of cranes since there are fewer hours of use. Furthermore, new technologies and machinery are being developed and used on sites, plus more tools and devices or a combination of many cranes are tackling the work of global offshore wind. In summary, crane drivers have to get used to, at least to some degree, a new and vivid working environment.

This also means that crane producers, platform owners or other stakeholders will have to adapt quickly to this shifting environment. Control over unmanned platforms, an alert responsiveness, a detailed overview over a possibly vast amount of machinery and work phases. People will need to react more independently of time and space.

Liebherr's approach within this energy revolution is two-fold. On the one hand, it accompanies platform owners, companies or system operators during the entire life cycle of their offshore wind business. The company has a very broad knowledge of wind and maritime technology, that goes beyond just building cranes.

Liebherr as a manufacturer produces components, which can be found in different


wind installations. It also produces high-quality concrete for wind power installations.

On the other hand, there is a focus on the crane situation in one spot in particular. The focus is on ensuring the operator, in this changing environment, can always rely on tested and trustworthy equipment and state-of-the-art features. These are crucial for general purpose offshore cranes, as supply and maintenance cranes, for example the Ram Luffing crane (RL), but also to some extent for Heavy Lift Offshore (HLO). Regardless of whether the work is on converter platforms, installation vessels or elsewhere, Liebherr is prepared.

The company has the capacity to produce several solutions in-house. Moreover, its team develops smart, special solutions in its own distinctive approach, in a way that is unique to the market.

One prominent example is LiMain. Short for Liebherr Intelligent Maintenance, this solution enables maintenance to be carried out remotely. The foundation of LiMain is its modular system architecture. It enables operators to determine the scope of intelligent maintenance meeting their particular needs. It is a fully digital, semi-automatic and remote maintenance system.

In fact, up to 75% less mobilisation and up to 50 fewer man-days on platforms are possible. As a result, platform owners can save on resources, whether personnel, material or transport. This is a winning combination of tool plus crane for platform environments within the field of offshore wind.

Module 2 Condition Monitoring and 3, Predictive Maintenance are a crucial support and simplifiers for crane drivers. Condition Monitoring benefits from sensor technology, detailed data about the crane, as well as component monitoring in real-time, delivering an unprecedented level of insight. Predictive Maintenance puts ad-hoc data into context, building on decades of experience from the construction of thousands of offshore cranes. The module serves as the foundation for an optimised product and component lifecycle.

The control and handling of Liebherr cranes is regularly praised by crane drivers too. Additionally, the in-house developed Litronic system allows crane drivers to have a full overview over crane, machinery and feature, maintaining control from their own cabin.

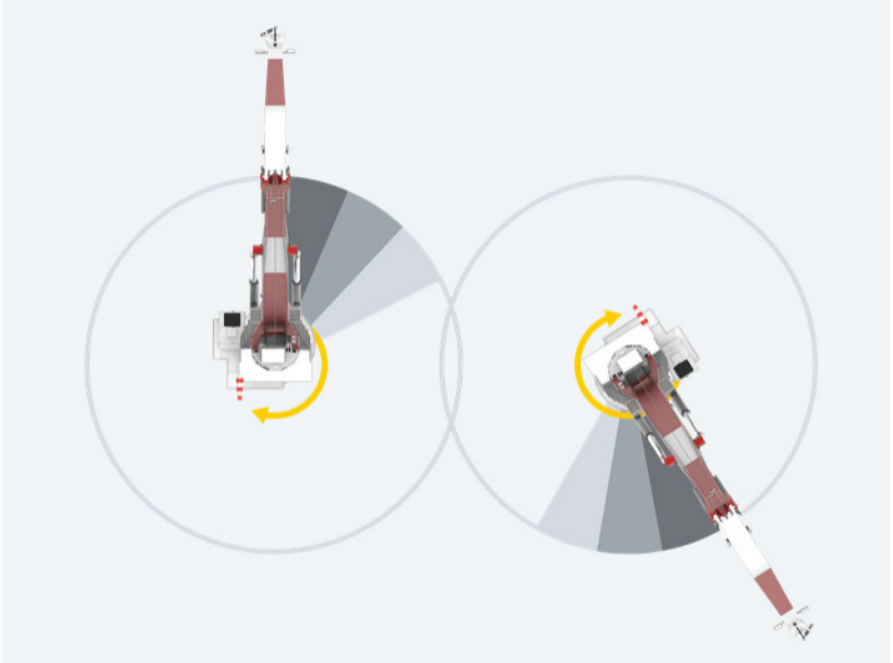
### Driver's cabin and crane control

Liebherr offers a new cabin with improved ergonomics, equipment as well as maximum comfort and optimal wide, panoramic visibility. In a winning combination with the latest control generation, more complex content and information can be received, prepared and monitored. The sensitive drive of machinery or tools could again be enhanced.

No matter the situation, the crane driver has a full overview. When adaptation is required, all controls are situated within his or her reach. To further increase safety during crane operations, several cameras can be installed to monitor hooks and winches.

### Crane Control System, Litronic®

Liebherr's in-house developed Litronic® is a crane control and management system. The main features of this modular-based control system are: crane control, load moment limitation and indication, engine management and monitoring of the whole crane functions.



This means, especially in combination with previously addressed cabin and its wide view, even in a fast and hectic working situation, the crane driver can react quickly and remain in control. Additionally, this level of automation and data transformation will become increasingly helpful for operators / platform owners gaining specific information about machinery and conditions, for phases when there is reduced personnel on platforms.

### Liebherr Collision Alert System (LiCAS) and defining working areas

Two further highlights of these in-house solutions concern crane collision protection, namely LiCAS and Defining working areas. Firstly, LiCas can avoid potential collisions. This additional assistance system sets new levels in operational support while handling cargo on board. Three warning zones for work safety can be found within the feature. Firstly, with the warning zone, as soon as the crane operator steers the crane into the first warning zone, a visual and acoustic warning signal will be seen and heard. In reduction zone, if the crane continues to approach another crane despite the first warning, the speeds of slewing and luffing gear will be reduced. Finally, if the crane is steered into the collision zone, the speed will be reduced until the crane comes to a complete standstill. The risk of a collision will be reduced to a minimum.

With 'defining working areas', up to five working sectors can be defined. The latter will be displayed on the crane monitor. There also is Sector Restriction, an assistant system that can support the crane driver during operation to avoid the load being moved into a restricted sector. Together, both systems can improve safety even more.

### Service with global approach and Remam

Looking at an upcoming wind offshore market consisting of more and bigger wind turbines with more unmanned platforms, stakeholders will need to rely on strong, supportive partners.

Therefore, Liebherr cranes are cared for independent of location. Customer service offers more than 50,000 original spare parts and maintains an ongoing service, with a service engineer sent to site within 24 hours, globally.

Additionally, material for construction can often be scarce and, in today's society, sustainability is not only important but is by degrees becoming a factor in business. Within the framework of the Reman programme, used components are made into new parts in accordance with industry standards. The programme includes important components such as diesel engines, hydraulic components, gearboxes and more.

In summary, it is of utmost importance to keep preparing for the changes in global offshore wind. With the help of smart features as well as in-house built solutions, we can find ways to remain on track in controlling unmanned platforms, remote maintenance and growing wind wheels.

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