

SAFETY AND CRANE LIFTS

- BENEFITS OF USING SIMULATION AIDED TRAINING



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A crane is a vital machine in many industries. At the same time, cranes and lifting operations account for a vast number of accidents due to a lack of training and safety awareness.

These accidents are dangerous for the people working with cranes and costly for the companies deploying them.

KoneCranes Training Institute estimates the average cost of a major incident to be USD 200,000, and the average cost per fatality exceeds USD 4 million.

The U.S Bureau of Safety and Environmental Enforcement states that apart from 2010 and 2017, the annual number of crane-related accidents accounts for upwards of 150 (in some years upwards of 110) accidents with off-shore cranes on oil rigs. This is two to almost four per week.

In Denmark alone, the number of on-shore accidents involving cranes averages around 113. That is equivalent to around two accidents per week. The Danish Health and Safety Authority (Arbejdstilsynet), responsible for work-related injuries, states that the slinger and banksman or other personnel typically are the ones who suffer the most injuries since they work near loads and equipment.

Luckily, modern computer-based simulators and incredibly realistic operating scenarios can significantly help train crane operators to become much more capable when operating cranes.

In this white paper, you can learn more about how Simulation Aided Training (SAT) can benefit your company. Also, we will take a closer look at the process of lifting using cranes. We will also explore how personnel involved in lifting operations can increase their safety awareness and general skills working with cranes.

WHY ARE CRANES COMPLICATED TO OPERATE?

The core definition of lifting is simply to move a load from one position to another vertically. However, adding a crane to the operation makes the process entirely more complicated.

Cranes can be defined using several categorisations, such as:

- Using a wire or chain to hoist
- Telescopic or lattice boom cranes
- Lifting inside or outside the supporting base
- Mobile or static
- Onshore or offshore

The most commonly used cranes lift the object outside their supporting base, making the lift into a balancing act much like a seesaw. These cranes are typically either mobile cranes or tower cranes. The trick is to balance the lift so that the crane won't tip over. However, this is the most common accident (for construction, mobile, and lorry cranes).

Cranes that lift inside their supporting bases, such as gantry or portal cranes, are not capable of tipping. Here, rigging accidents are the most common.

Offshore cranes must account for dynamic conditions such as wind, waves, and current. All three components may either amplify or negate each other and may change instantly. Thus, the offshore lift requires a significant increase in operator awareness, force calculation, and environmental loads.

In other words, even though offshore cranes share the fundamental operational challenges of other cranes, they are manoeuvred in such challenging environments so that the risk factor becomes much higher compared to onshore.

Offshore lifting offers, broadly speaking, a much more comprehensive range of challenges since the sea and weather conditions alone make for vastly different lifting scenarios.

Main challenges lifting offshore:

- Offshore lifts are often dynamic, meaning that either the crane and/or the load's destination are on a moving surface – e.g. lifting from one ship to another.
- Offshore lifts are carried out in highly weather-exposed work sites. Cargo, platform, and cranes are exposed to current, winds waves etc.
- Damage caused by dropped loads on offshore sites can be significantly more costly to repair.

ADVANTAGES USING SIMULATION-AIDED TRAINING

The value of on-the-job training, using a simulator, provides a safe training environment for crane operators. They can fast-track their lifting skills, gain realistic lifting experience and competence by using the simulator.

Experience shows that SAT is an unrivalled, efficient way to fast-track crane operators' capabilities and confidence. Observations from the operational perspective show that:

- SAT can improve lifting efficiency by 20 to 30%.
- SAT can reduce accidents by up to 95%.
- SAT builds a more robust performance and safety culture

Here are some of the significant advantages of using crane simulators to educate crane operators.

INCREASE SAFETY AWARENESS

By putting a crane operator in a simulator, you can expose the operator to many scenarios. In this hazardless environment, the operator can get a close to real-life experience with, e.g. poorly secured loads. Dropping a heavy object in your simulator is an eye-opening experience as the simulator behaves precisely like a crane on a work site.

EVALUATE COMPLEX LIFTING SCENARIOS BEFOREHAND

Simulating lifts before executing plans in real-life reveals challenges beforehand. Our simulators can be programmed precisely to simulate a lift well ahead of any critical operation. It is potentially a huge benefit since the crane operator can identify difficulties during the simulated lift, otherwise present during the actual operation.

We have experience from the port sector how terminals can prepare a green-field terminal (brand new terminal) where the cranes not yet have been delivered to become highly efficient and safe when going "live", mainly by using simulators to build the operator's skills, competence, and compliance.

OPTIMISE THE OPERATOR'S WORKFLOW

Port's and harbour's measure of efficiency is how many lifts they can perform per hour. A simulator can help identify where crane operators need to improve their workflow to maximise the number of lifts per hour.

REDUCE EXPENSIVE DOWNTIME

In our experience, up to 85 percentage of crane failures are caused by human error. A way to avoid costly breakdowns is to ensure operators have the proper training and knowledge to cope with many different scenarios related to their specific lifting tasks.

PRE-ASSESS CRANE OPERATORS AND SLINGER AND BANKSMAN

When hiring new staff, a simulator can be a valuable tool for evaluating the skill level of the applicants. The simulator can act as an assessment tool where candidates show the proficient skills needed for a particular job.

LIFTING - ROLES AND RESPONSIBILITIES

Cranes are the backbone of a variety of tasks that require lifting. Whether the load is handled by a small crane operated by a single person or as part of a massive rig, the people involved in the lift are vital to the operation's safety and success.

A commonly used crane used both on- and offshore is a tower crane. When a tower crane is operating, it involves three people:

- The crane operator
- The slinger and banksman responsible for rigging the load
- The appointed person in charge of the entire operation

From his seat on the crane itself, the crane operator's responsibility is, broadly speaking, to assess the task beforehand, verify the load is securely rigged, and finally, complete the lift.

The slinger and banksman work on the same level as the load. The primary responsibility of the slinger and banksman is to rig the load so it stays fixed during the lift. Loads behave differently once the lift starts. For example, some loads, e.g. might be prone to wind exposure, while other loads must be handled carefully when picked up or placed at the destination. Being physically a long way from the actual load, the crane operator must trust the slinger and banksman to rig the load in such a way that nothing shifts place or otherwise complicates the lift.

The appointed person is the on-site responsible for lifting operations on a work site.

The appointed person oversees the entire lift – from desktop planning to the actual lift. Being responsible for all lifting operations entails a deep understanding of lifting theory, how cranes function, and how the slinger and banksman operate and rig the load.

Several modern cranes rely on computers to operate. They are programmable to be extremely task-specific, but even though computers are capable of helping the crane operator execute the task, theoretical and practical knowledge about the crane is essential.

The scope of any crane operation is restricted by, e.g. the crane itself, the weather, teamwork, and the laws of physics. Knowing the crane's capabilities and identifying potential risks are essential for safe operations making training an absolute necessity for any crane operator and other personnel working with cranes.

SUMMARY

The plethora of cranes around the world on onshore and offshore worksites all cater to the same need: To move a load from one place to another. The success of that operation is a matter of how capable and well-trained the operator is. To execute a lift correctly, the crane operator needs to have experience and know-how, and Simulation Aided Training is a perfect sandbox for crane operators to practice and boost their skills.

From a financial perspective Simulation Aided Training offers many advantages, e.g. the possibility to practice complex lifts beforehand, significantly reducing errors during the actual lift. Or as a method to optimise workflows and eliminate bad habits, reducing costs and increasing safety.





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