

# DRIVING TOWER CRANE CONTROL TO NEW HEIGHTS

Mikael Holmberg, Segment Sales Manager, Cranes and Winches at ABB Drive Products, explains how advances in crane automation, control systems and safety technologies are shaping the future of construction.

## MODERN TECH FOR MODERN BUILDING SITES

Tower cranes are the backbone of modern construction. But the industry faces several ongoing challenges. Issues with crane stability, energy efficiency, and the complexities of integrating new technologies make innovation more important than ever. Also, since tower cranes aren't permanent fixtures, they require smooth commissioning to minimize disruption and environmental impact.

This is where the dedicated tower crane functions built into ABB's market-leading variable speed drives (VSDs) offer major advantages in terms of safety, performance and controllability. Designed to make setup and operation simpler and more reliable, they are perfectly suited for both new crane developments and retrofitting projects. Whether cranes operate in bustling cityscapes or remote sites, these intelligent solutions, coupled with our years of application expertise, keep operations running smoothly under all

conditions.

ABB drives, like the state-of-the-art ACS880, feature specialized software for precise control of all the vital movements – hoisting (for raising and lowering loads), trolleying (moving the hoist along the boom, luffing (changing the angle of boom), and slewing (rotating the boom horizontally). Additional crane-specific features also include mechanical hoist brake control, hoist speed optimization, and innovative machine safety functions.

Through the right combination of motors, drives, PLCs (programmable logic controllers), and HMI (human-machine interface), tower cranes can be far more productive, safe, and reliable. Combining advanced control systems and dedicated application software based on engineering expertise addresses challenges like motor instability, drive inefficiency, poor integration, and safety concerns while allowing benefits like energy sharing between drives – ultimately improving crane operations and site productivity.

**LET'S CONTINUE  
THE CONVERSATION.  
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AND LET'S EXPLORE  
WHAT'S POSSIBLE**

## PUTTING BRAIN POWER INTO CRANE POWER

Construction sites are only getting more complex. Tower crane systems that facilitate business processes, energy savings, and safety improvements are, therefore, crucial. The good news is that, while construction has grown in complexity, automation technology has developed to the point where it can adjust cranes reliably in real time, helping to optimize performance.

Control over crane movements is critical, not just for efficiency but for safety, too. Issues like sudden load shifts and oscillation can cause delays and safety risks. The precise control offered by ABB drives keeps movements steady and without disruptions.

The drive-based intelligence featured in ABB's ACS880 drive incorporates well-proven, dedicated software accessible through the +N5650 Tower Crane software package, offering advanced functionality to smoothly control the crane movements. This pre-engineered and tested software forms the core of construction crane control, enabling precise adjustments in movement with performance tailored to each site's specific needs. It also significantly reduces development costs for crane builders.

## STEADY HANDLING, SECURE WORKSITES

In addition to making operations more efficient, control and precision also prevent accidents. Advances in drive-based motion control technology are eliminating jerky lifting and lowering, stopping sudden load shifts and keeping positioning accurate, reducing potentially expensive and dangerous mistakes.

Another key development is the optimization of start-up torque, which reduces the strain on hoist motors. ABB's crane systems can monitor and adjust hoisting speed automatically, depending on the load weight, speeding up cycle times and improving overall efficiency. Furthermore, should a mechanical brake on the hoist should fail, the brake match function can catch it "on the fly", preventing the load from falling and enabling it to be lowered safely to the ground. Slew control also keeps the boom (or jib) rotating smoothly without oscillating or overshooting – making precise positioning easier and cutting the risk of accidents or damage.

## PUSHING CRANE CAPABILITIES EVEN FURTHER

Construction sites often have multiple cranes working closely together, meaning collisions are a serious concern. PLCs like ABB's AC500-S Safety support features such as fail-safe floating point and fail-safe trigonometric calculation in combination with safe communication (sometimes wireless). This approach can detect and avoid crashes between cranes, buildings, and other objects in the same area.

It's also essential to avoid suspending loads over highways, schools, hospitals, and other sensitive locations. With the smart safety functions offered by ABB's PLCs it is possible to set no-go zones to protect workers, equipment, and surrounding structures. The option to synchronize hoist, trolley, and slewing movements further improves precision.

## LIFTING LOADS, LOWERING COSTS

Energy efficiency in crane operations is a growing trend, with many crane manufacturers striving to cut energy waste and lower operating costs – a win-win. Because tower cranes constantly switch between motoring (lifting) and generator (lowering) modes, they create huge energy demands. A key capability of drives is that they can regenerate energy from lowering loads and braking and share

it over a common DC-bus.

This energy that captures and redistributes would otherwise be lost so it can power other crane functions. In some cases, the drive package can even feed excess energy back into the grid if the environment allows.

## SAFETY THAT WON'T BUCKLE UNDER PRESSURE

As well as improving efficiency, modern crane manufacturers are placing greater emphasis on safety by opting for advanced features based on an open safety philosophy that meets rigorous global standards. All

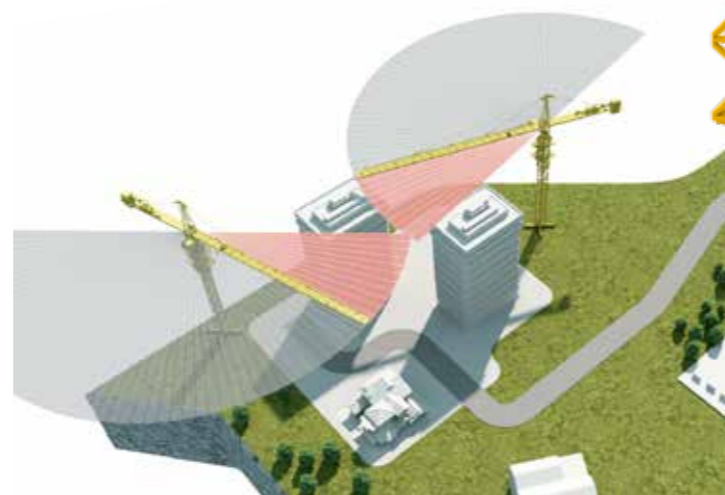
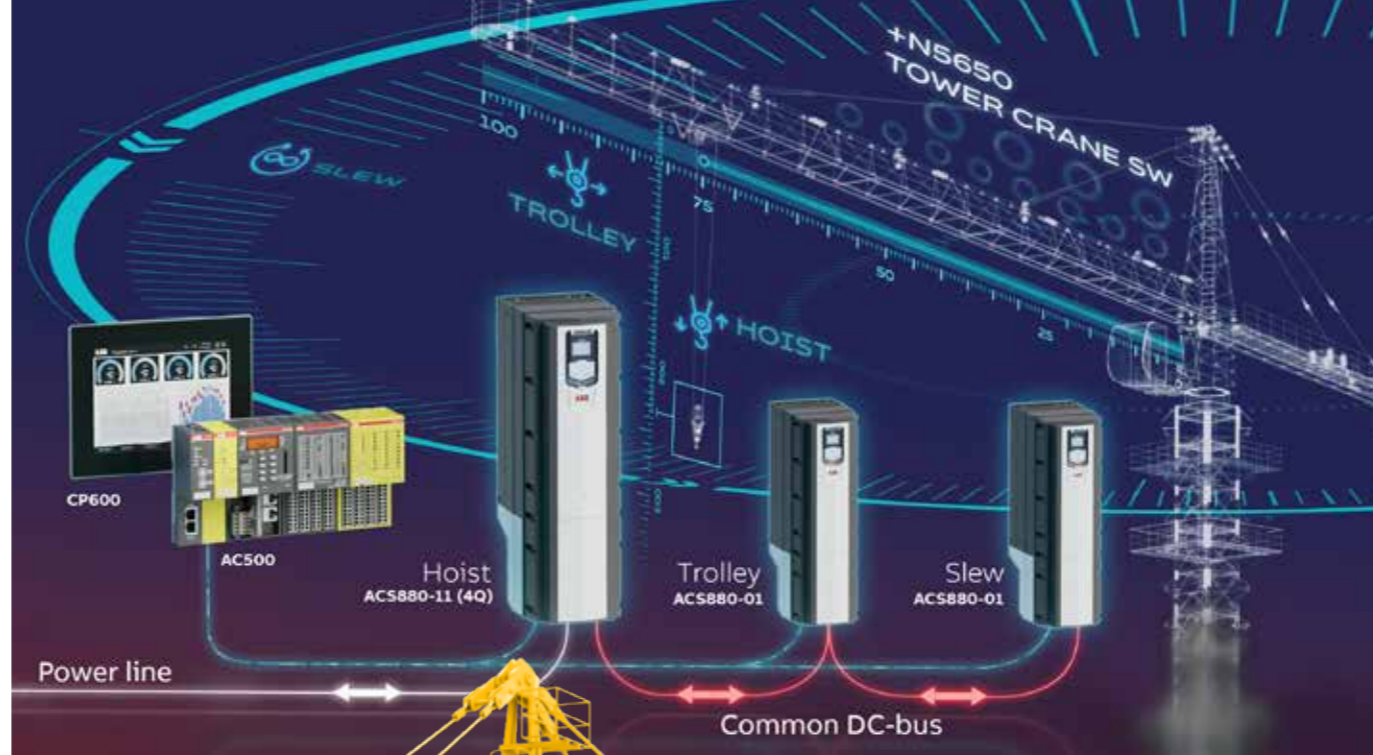


ABB drives, for example, incorporate Safe Torque Off (STO) that immediately halts dangerous movements in an emergency. Additional functional safety plug-in modules can expand the drive's built-in safety. In ABB's ACS880 drives these functions are triggered via PROFIsafe over PROFINET, enabling seamless communication between the drive and a safety PLC such as the AC500-S Safety PLC. This provides a flexible and scalable solution for implementing functions like Safely-Limited Speed (SLS) during operation. This approach can support global standards, including PROFINET/PROFIsafe and CIP Safety. That means certified safety wherever tower cranes are deployed.

## LOCKED IN AND LINKED UP

With more cranes using remote access and cloud connectivity, cyber security is an increasing challenge. Advanced security features included in PLCs like ABB's AC500 are an essential part of the crane's overall security systems. Crane owners or OEMs can also use the technology to identify and fix issues remotely – that means fewer site visits and less unplanned downtime. Plus, secure cloud connectivity offers transparency and insight, keeping operations running smoothly.

## THE SKYLINE OF TOMORROW

Digitalization, automation, safety, security, and sustainability are shaping the future of tower-crane technology. ABB is leading the way with new solutions that embrace these global trends. From remote control with smart automation, safety and security that allows one operator to control multiple cranes remotely, to connected diagnostics that cut downtime, we're pushing boundaries. And with energy-efficient innovations like regenerative braking and smart power distribution, we're helping construction become more sustainable, too.



**GO TO**



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**TO SEE OUR TOWER-CRANE TECH IN ACTION.**

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