

Drives and control technology

# Automation application solutions

## Cranes

# Complete automation solutions from one company

ABB has developed a comprehensive range of fully integrated crane technology solutions including AC and DC drives, controls and safety engineering. We offer a unique capability for customers to meet all their crane automation requirements from a single, high quality manufacturer.

This also comes with the complete global technical, application and service support provided by our skilled and experienced engineers who understand the particular demands and challenges of the crane industry.

The ABB crane portfolio is further enhanced by specific solutions, such as remote monitoring and predefined application control programs for cranes, along with engineering and software development support.

## How ABB can help you

### Application solutions

- Crane regulation programs
- Torque memory
- Brake control and monitoring
- Indoor sensorless anti-sway control

### Productivity

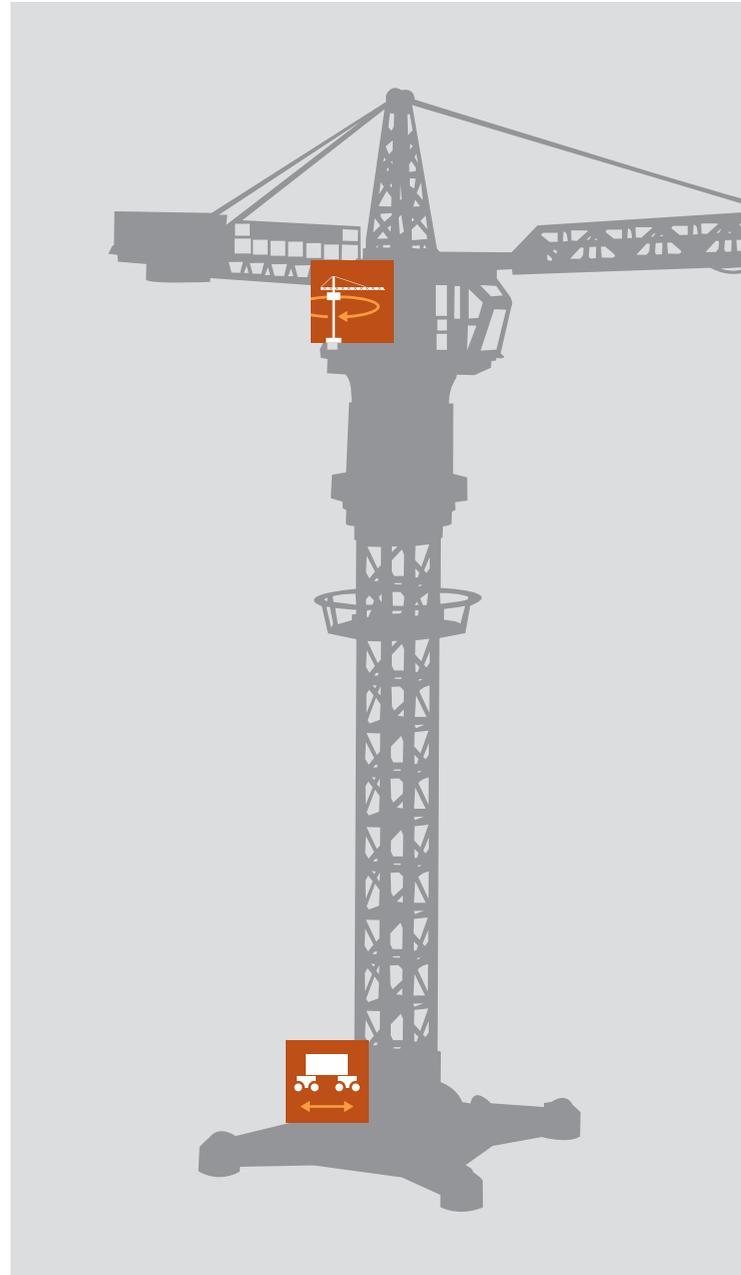
- Energy efficient drives and motors
- High availability
- Load speed control

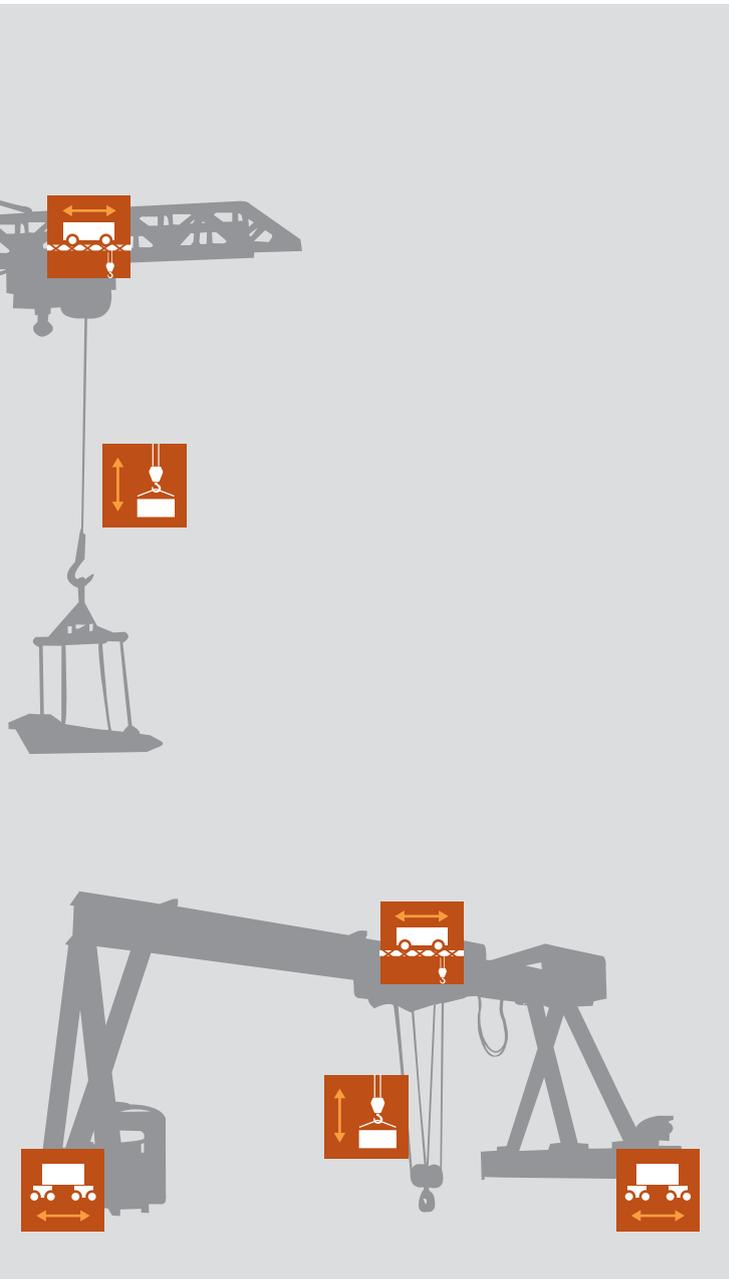
### Easy to use

- Commissioning assistant
- Crane system check
- Continuous engineering tool
- Ready-made user macros

### Service

- Remote access
- Service metering
- Global life cycle support
- Global availability of spare parts





## Crane subsystems

### Hoisting units

Several hoisting drums can be driven by a single hoisting unit, while several drives can also operate a hoisting drum. The hoisting drum is secured by a mechanical brake.

Types of control:

- Synchronization control
- Master/follower
- Positioning
- Hoist limiting
- Load monitoring



### Travelling gear

The traveling gear consists of one drive system per side, driven synchronously to prevent different levels of wheel wear and tear.

Types of control:

- Synchronization control
- Master/follower
- Speed-controlled positioning
- Travel limit



### Trolley travel

The traveling trolley has to meet the same demands as the traveling gear, if it consists of one drive system per side.

Types of control:

- Synchronization control
- Master/follower
- Speed-controlled positioning
- Travel limit



### Swing

For the crane swing, tower torsion is critical.

Types of control:

- Speed-controlled positioning



# ABB crane automation technology



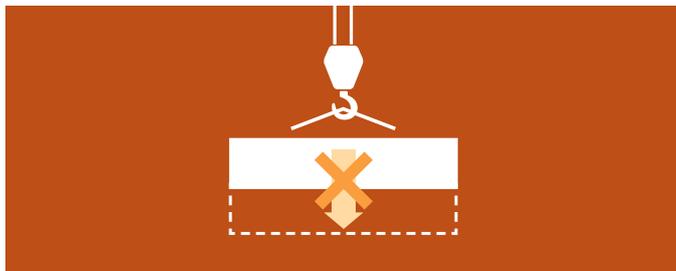
## Security functions

### Speed adjustment

Speed adjustment constantly compares the target and actual motor shaft speeds, and immediately stops the motor as soon as a deviation is recognized.

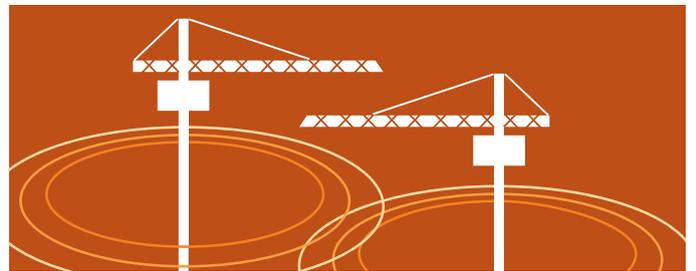
### Brake control

Brake control integrates the mechanical brake functions with torque storage and premagnetization. ABB drives can generate the full torque at the motor shaft before the brake is opened. In addition, the drives can be integrated within the brake control circuit to monitor and control the braking status signals to further increase safety when starting or stopping.



### Travel limit

Using ABB drives, the speed in critical zones is limited to preset values. Sensors for the upper and lower limits stop the load in the final position. A “quick-stop” function can be activated in emergency.



### Area safeguards and anti-collision

Areas blocked-off for crane operation, such as houses or other cranes, are designated automatically by safety-certified trigonometric operations in the control system.

### Crane system check

The crane system check comprises electric and mechanical inspections. Torque proving ensures that the drive and motor can generate the necessary torque and that the mechanical brake does not slip before the drive opens the brake.

### Rope tension

This function prevents potential cable sagging, which can arise in high winds, causing a hazard at the hoisting drum.

### Position measurement

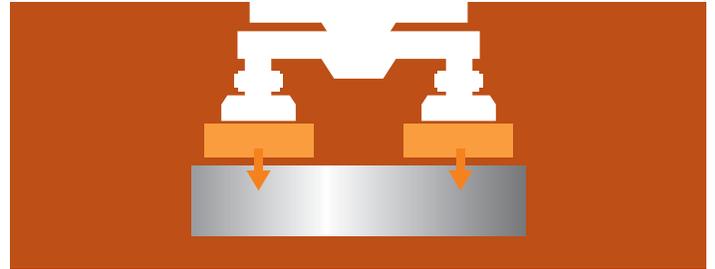
The positioning function determines the current position of the load with the aid of shaft encoders and scaling parameters. The crane regulation program can then use this information in additional operations such as setting software end limit values.

### Lifting magnets

It is common for cranes to lift magnetic materials with a magnet instead of a classic hook. The drive application program enables the piece by piece placing of steel sheets from a stack that was previously placed.

### Service metering

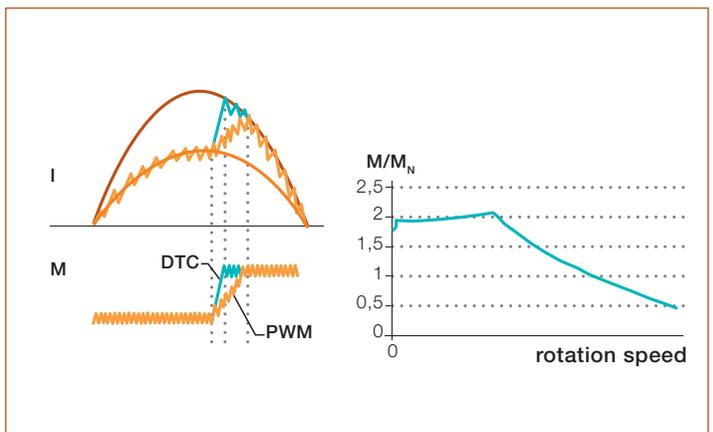
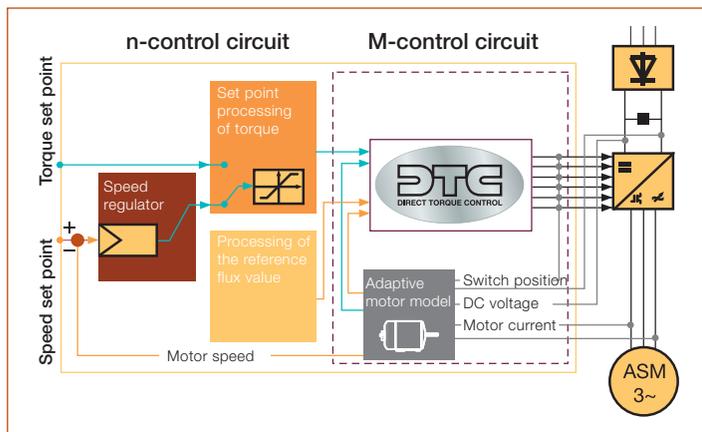
The program includes programmable metering of operating times and mechanical brake usage for servicing purposes.



### Performance optimization

Load speed regulation optimizes the speed of the hoisting unit to match the load weight. With no load, the drive works well into the motor's field weakening range. If a load is suspended the maximum speed is reduced automatically. This both minimizes crane operating time and increases productivity.

## Types of control



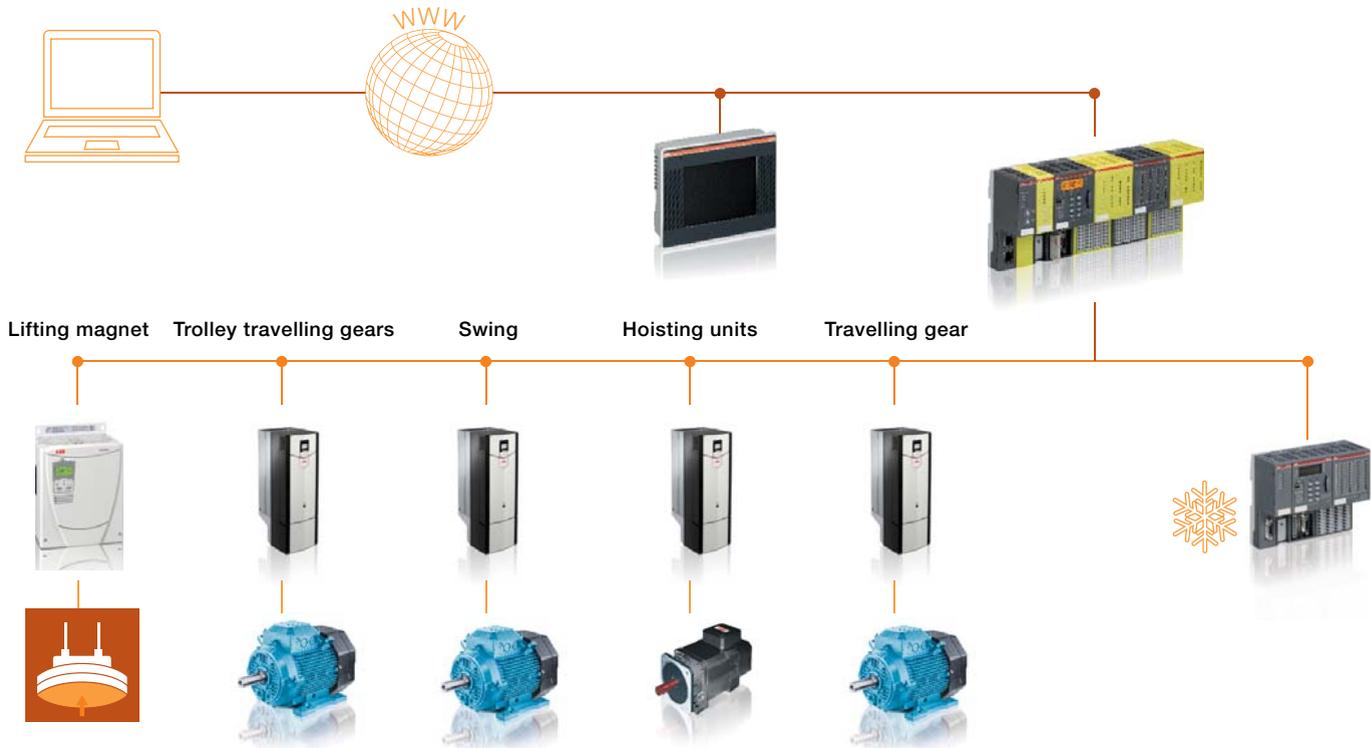
### Direct Torque Control

Direct torque control (DTC) technology facilitates the precise regulation of speed and torque with or without rotary encoder feedback from the motor shaft. Through DTC, the crane regulation program offers higher levels of operational reliability and more precise regulation of lower motor speeds with high torque levels.

### Master follower and synchronization

In a master follower application the drive system consists of several drives linked together. If there are several motors and one drum, the load can be distributed evenly. When there are several separate drums, their shafts can be synchronized with each other. This also includes rapid switching logic between the standalone and master follower mode.

# ABB products for crane automation



## Platform

ABB has the ideal solution for every crane application. Using a platform from a single supplier ensures seamless communication between all our products.

## Networking

The Safety-SPS AC500-S PLC facilitates state of the art decentralized security solutions with PROFIsafe via PROFINET. The drive manager in the PLC provides direct access via PROFINET to all the parameters of an ABB drive via the AC500 PLC or AC500-S control software.

## Easy to use

ABB industrial drives are easily configured and commissioned using the easy to use operator control panel. All the values and parameters are also made accessible in the drive manager control system via the real time network. This enables 24/7 remote maintenance of the drives and controls via the internet.

## Functional safety

The integrated safety functions of the ABB industrial drives open up new possibilities for machine security. The Safety SPS AC500-S PLC offers a flexible platform for more complex requirements through its comprehensive selection of trigonometric functions and structured text programming according to SIL 3/PL.

## Libraries

ABB supplies the control system complete with function libraries that provide modules for key functions such as safety.

## Energy efficiency

ABB's highly efficient IE2 and IE3 motors and drives (with and without power regeneration options) help to save energy throughout crane operation.



### Drive technology

ABB provides drive systems and motors across the broad power range required by crane applications. ABB industrial drives are used in demanding applications and, thanks to their programmability, they are readily adapted to crane applications. The modern DCS800 DC drive is ideal for both new installations and modernization and upgrading projects. ABB also offers a broad range of IE2 and IE3 standard motors which are both exceptionally reliable and energy-efficient.

### Control and safety technology

The SPS AC500 PLC family is precisely scalable for each specific automation task in terms of its performance, functionality, inputs and outputs, standard field buses and networks. Standardized programming from small to complex crane applications is straightforward. AC500, the high-performance flagship PLC, offers a wide range of power levels and scalability in a uniform, simple concept. The Safety-SPS AC500-S facilitates decentralized security solutions with PROFIsafe via PROFINET. The AC500-XC (eXtreme Conditions) series extends the control options to applications in a hostile environment.

### Operating technology

ABB offers a complete range of display and operating devices developed to meet the requirements of automation processes for the highest levels of data transparency and efficiency. The range of HMIs (human machine interfaces) extends from simple operating panels to intelligent, programmable CP600 operating terminals with color TFT or touch screen displays.

# Contact us

For more information please contact  
your local ABB representative or visit:

[www.abb.com/drives](http://www.abb.com/drives)

[www.abb.com/plc](http://www.abb.com/plc)

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