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SIMOCRANE Drive-Based Crane Technology (DBT)

SIMOCRANE in SINAMICS:
Simple, flexible and fast commissioning

[siemens.com/cranes](https://www.siemens.com/cranes)

SIMOCRANE drive-based functionality for crane applications:

Within the SINAMICS environment, SIMOCRANE drive-based functionality offers a compact functional scope. Fast commissioning by using standard applications and a high degree of flexibility through the appropriate adaptation possibilities.



Simple – low engineering effort

The drive-based functionality for crane applications is implemented in two software solutions: SIMOCRANE Drive-Based Technology and SIMOCRANE Drive-Based Sway Control.

Both technologies are integrated in the SINAMICS drive system and provide the function blocks needed to control the motions of crane drives. By using pre-configured standard applications for hoist, trolley or gantry, the function blocks are easily integrated into the drive control, resulting in shorter engineering time and fewer commissioning costs.

Using standard applications (“ready-to-run”) and simple adaptation (“ready-to-apply”) to start up a crane drive, only basic knowledge of the SINAMICS drive system is required. The software commissioning tool STARTER used by SINAMICS can be used unchanged.

Fast – increase productivity

Load-dependent field weakening for hoist applications is a functionality integrated in SIMOCRANE Drive-Based Technology. Compared to operating at full load, this solution automatically increases the maximal speed for lifting and lowering as a function of the current load. With this functionality, a lift cycle with partial-load and no-load is even faster, increasing the cranes’ productivity.

With SIMOCRANE Drive-Based Sway Control, the load sway is damped during trolley or gantry traveling. Without the load sway, a faster and easier traveling and positioning of the load is possible. The sway damping is integrated in the movement. No additional waiting time or additional operation for damping the load sway is necessary.

Drive-Based Technology (DBT)



Adjustable progressive manual controller

Enables drive movement with high precision via a directly connected master switch for manual positioning.



Smart slow-down

Allows you to limit the drive speed when reaching a predefined prelimit switch.



Load sag prevention (Start pulse)

Prevents load sag when starting hoist gear with a suspended load.



Adaptive speed to operate at peak performance (load-dependent field weakening)

Calculates additional speed setpoints, depending on the load. Partial loads automatically run at a higher speed than full loads.



Overspeed monitoring

Monitors overspeed or detects deviations between the speed setpoint and actual values.



Digital Master controller

Up to 4 speed levels can be defined for simple operation.



Current distribution monitoring

Compares the current setpoints or actual values of the master and slave and sends a message if a specified value is deviated.



Add-on with DBSC

Performance enhancement with sway control function.



For both single-axis and multi-axes solution

SIMOCRANE Drive-Based Technology V1.0 SP2 HF1

Ordering number:
6GA7270-1AA20-0AA0



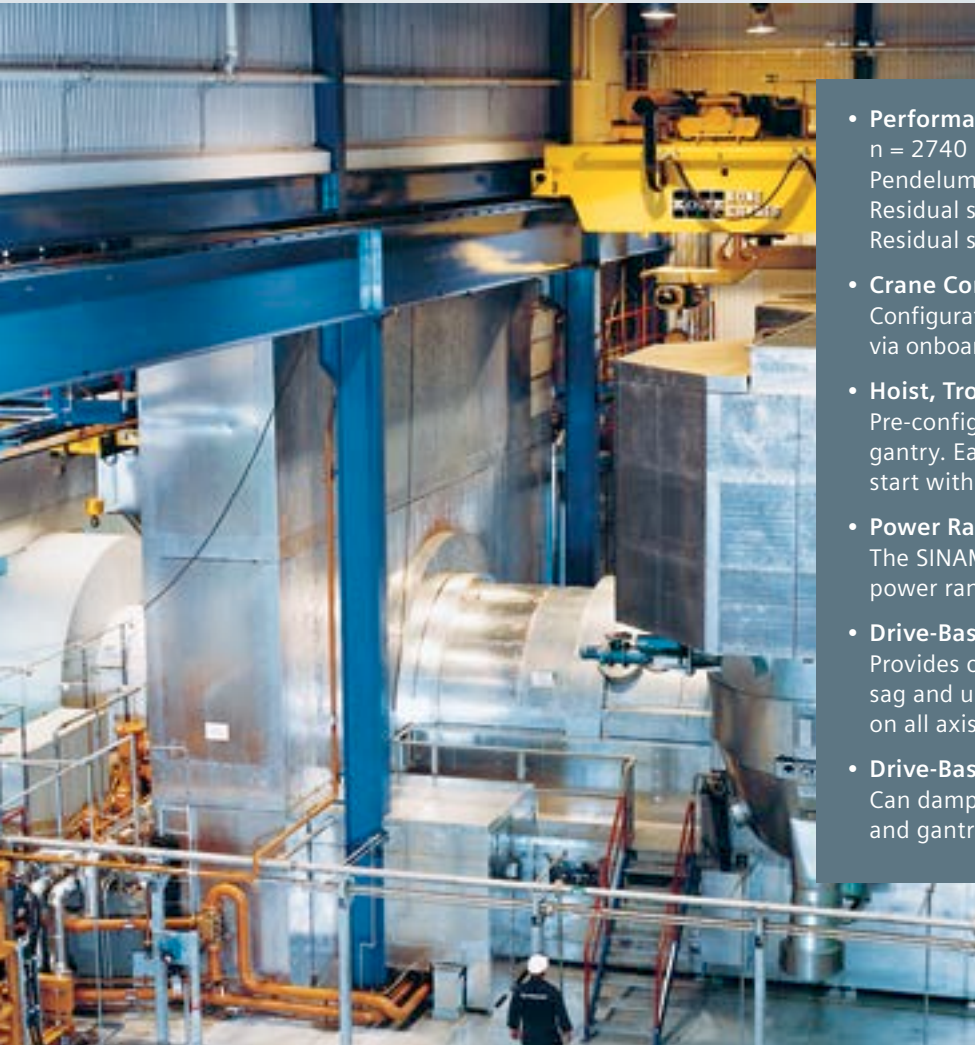
Drive-Based Sway Control (DBSC)

	Manual mode		Positioning mode
After the axis has stopped or reached a constant velocity, no load sway remains.		Both sway damping and required accuracy are considered in positioning procedure.	
	Changing target on the fly		Switching Operation Mode on the fly
The target position can be changed during the movement.		With activated sway control, the manual mode can be switched to positioning mode during the movement and vice versa.	
	Safer behavior in limit switch		Standalone or based on DBT
The sway control is automatically disabled in area of limit switch.		Can be integrated with DBT.	
	Ready-to-run		Ready-to-apply
With pre-configured application on CF-card for trolley or gantry. Control via onboard-I/O signals, only parameterization is needed.		With standard application example and description.	
	Single-axis solution		Multi-axis solution
With AC/AC drives (CU310-2) and corresponding SINAMICS Power Modules PM240-2 and Chassis.		With DC/AC drives (CU320-2) and SINAMICS Motor Module (Book size and Chassis).	



Single-axis solution	Multi-axis solution
<p>SIMOCRANE Drive-Based Sway Control Manual mode Ordering number: 6GA7280-1AA10-0AB0</p>	<p>SIMOCRANE Drive-Based Sway Control Manual mode Ordering number: 6SL3077-6AA00-2AB0</p>
<p>SIMOCRANE Drive-Based Sway Control Manual mode and Positioning Ordering number: 6GA7280-1AA20-0AB0</p>	<p>SIMOCRANE Drive-Based Sway Control Manual mode and Positioning Ordering number: 6SL3077-6AA00-3AB0</p>

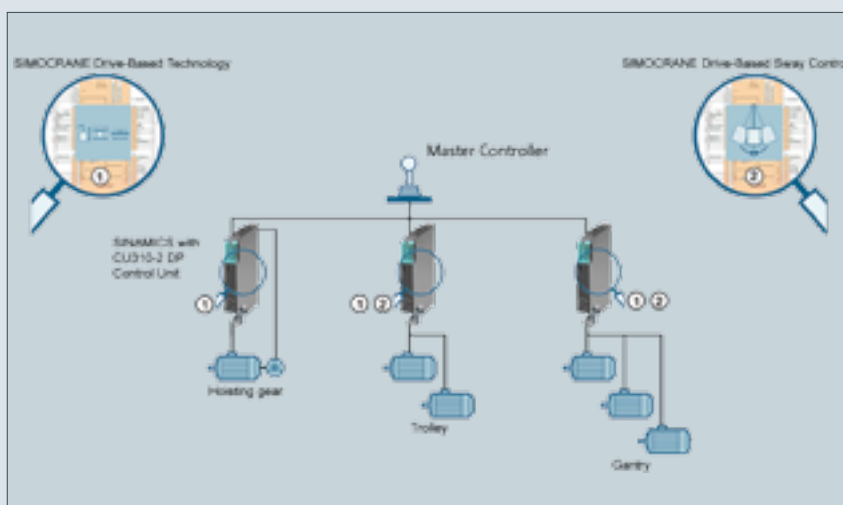
Application: fast and easy control solution for single-axis control requirements



- Performance Manual Mode:**
 - n = 2740 RPM, ramp-up time = 2 s
 - Pendulum length = 2.27 m
 - Residual sway = 1 mm at standstill speed 20 RPM
 - Residual sway = 0 mm at standstill speed 0 RPM
- Crane Configuration**
 Configuration with 3 single-axis drives, controlled via onboard I/O of SINAMICS Control Unit (CU310-2)
- Hoist, Trolley or Gantry**
 Pre-configured application for hoist or trolley or gantry. Easy installation: the commissioning can start with low engineering effort
- Power Range**
 The SINAMICS AC/AC single-axis drives cover the power range from 0.55 kW to 250 kW
- Drive-Based Technology**
 Provides crane-specific functions: prevents load sag and uses adaptive speeds. Smart slow-down on all axis
- Drive-Based Sway Control**
 Can damp sway in manual operation for trolley and gantry



For more information, refer to catalog D21.4 (Chapter 7).




For hoist applications, an encoder is requested for safety reasons and for providing pendulum length to cross travel (trolley) and long travel (gantry).

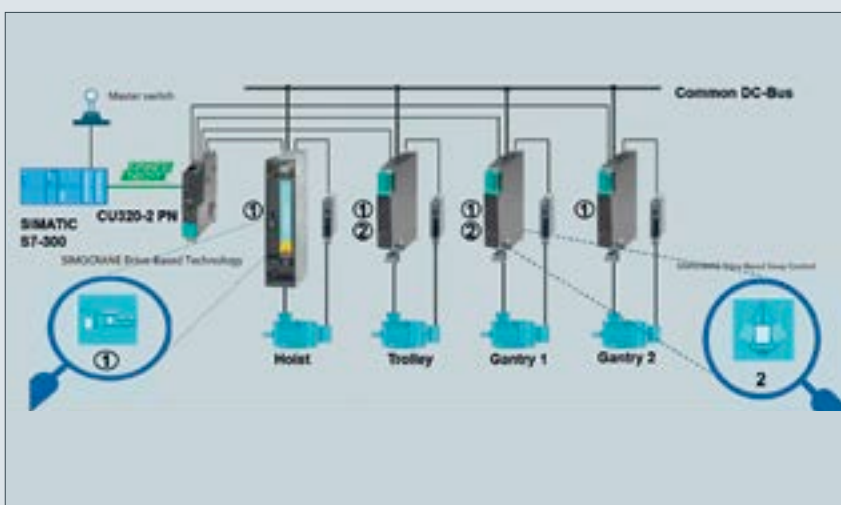
For sensorless sway control, no encoder is required in manual operation. Only for positioning operation encoders are required for trolley and gantry.

Application: comprehensive control solution for multi-axis control requirements



- **Crane Control**
by PLC via PROFINET communication 
- **Performance Positioning Mode**
v = 20 m/min, ramp up time = 3
Pendelum length = 7.9 m
Distance = 7 m, time = 32.18 s, precision = 1 mm
Residual sway = 0.47mm
- **Crane Configuration**
SINAMICS S120 topology with multi-axis drives with regenerative Line Module, Motor Modules and Control Unit (CU320-2)
- **Power Range**
SINAMICS DC/AC multi-axis cover the power range: 1.6 kW to 800 kW
- **Communication**
The ProfiSafe telegram enables the SINAMICS integrated safety function by PROFINET communication
- **Drive-Based Technology**
Crane-specific motion control functions for hoist, short travel and long travel
- **Drive-Based Sway Control**
is added to short travel and long travel for sway damping in manual and positioning mode

For more information, refer to catalogue D21.4.



The Ready-to-Apply solution is a standard application example with a mask for users to select the configuration of each required axis.

After selection, the required files are generated automatically.

PROFINET communication combines the field bus and Ethernet advantages. Configuration easily adaptable to be fine-tuned for enhanced productivity.

SINAMICS drives for crane applications:

In conjunction with SIMOCRANE technology, SINAMICS is available as drive system for the closed-loop control of hoisting, trolley, slewing, luffing and long travel gears.



SIMOCRANE meets SINAMICS

The SINAMICS S120 offers the optimum system for each and every drive application – and all of the drives can be engineered, parameterized, commissioned and operated in a standard way.

This system represents an entry-level solution for AC/AC single-axis drives and coordinated AC/DC drives for multi-axis applications, making it the perfect basis for simple and more sophisticated crane applications in all industrial sectors.

Modular Solution

SINAMICS S120 includes single-axis (AC/AC drive system) as well as multi-axis (DC/AC drive system) configurations. Both systems have a modular design.

The AC/AC drive system comprises a Control Unit (CU 310-2) and Power Module (PM) for the power range from 0.55 kW to 250 kW. The DC/AC drive system includes a Line Module, a Control Unit (CU320-2) and Motor Module for the power range from 1 kW to 800 kW. Active Line Modules return regenerative energy to the supply system.

SIMOCRANE functions can be applied modularly on demand. SIMOCRANE Drive-Based Technology can be used with optional SIMOCRANE Drive-Based Sway Control.

Integrated Safety

As in SINAMICS, the crane smart features are supplemented by integrated safety functions. These support the simple implementation of innovative safety concepts which conform to standards.

Safety functions are fully integrated in the control system preventing damage to crane, load and surrounding objects or people. All basic functions are license-free. The Safety Integrated Extended Functions require the optional license for each drive.

Smart functions

Load sag prevention, smart slow-down, fine manual positioning, adaptive speed to operate at peak performance are smart features of SIMOCRANE Drive-Based Technology. Sensorless sway control is an add-on highlight of SIMOCRANE Drive-Based Sway Control. All intelligence are embedded in SINAMICS drives.

Simple startup

Via Basic Operator Panel (BOP20) or even Web Browser, commissioning can be started by using the 'Ready-to-Run' solution without any engineering effort.

In case of 'Ready-to-Apply', the crane functions are configured automatically by simply selecting the axis and the set value.

The crane functions are integrated in the drive parameterization. The parameterization is individually adaptable using the STARTER software or BOP20 or web browser.

