



Application software libraries for
STS and RTG harbor cranes

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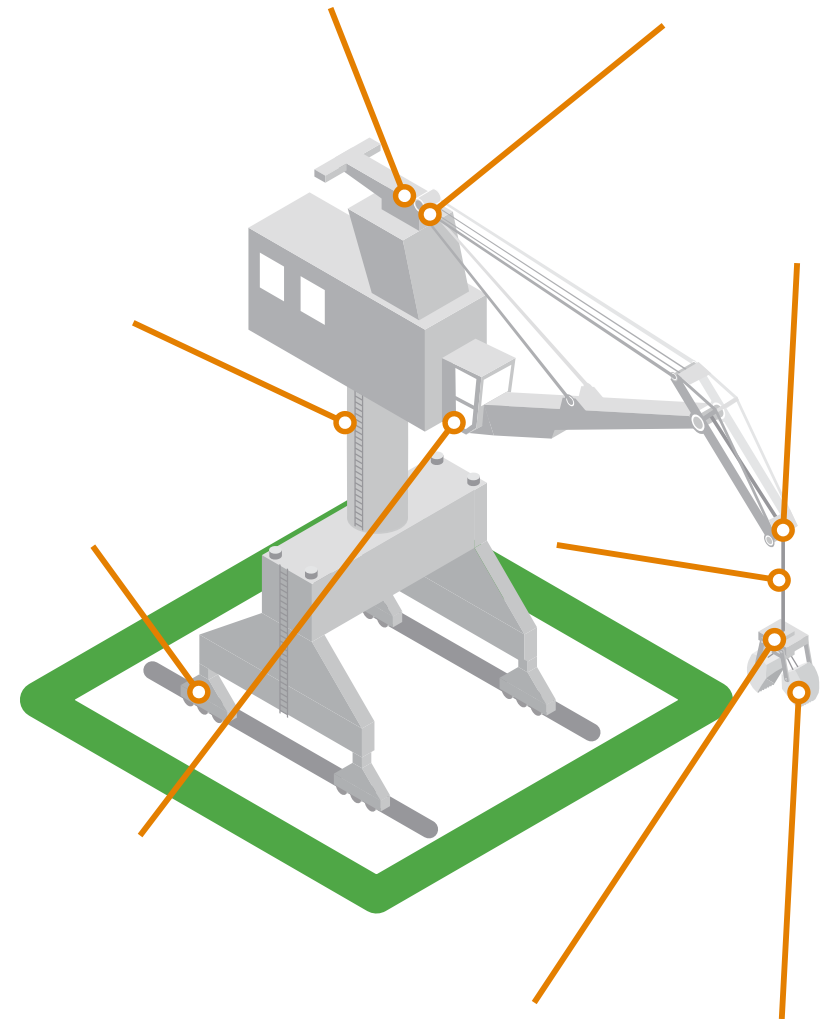


Application software libraries for STS and RTG harbor cranes

Shorten your engineering time with extensively tested application software! SoMachine™ libraries provide software functionality in the form of ready-to-use function blocks (AFBs = Application Function Blocks), which are supplied for many basic common automation tasks and machine functionalities. They can be easily configured, customised, and implemented in your machine program.

Discover our smart functions dedicated to bulk Ship-to-Shore and Rubber-tired-gantry cranes:

1. Advanced positioning
2. Limit switch management
3. Smooth slewing
4. Monitoring data storage
5. Load overspeed control
6. Wind speed control
7. Speed optimisation rope slack
8. Grab control
9. Overload control EN 15011
10. Diagnostic coverage

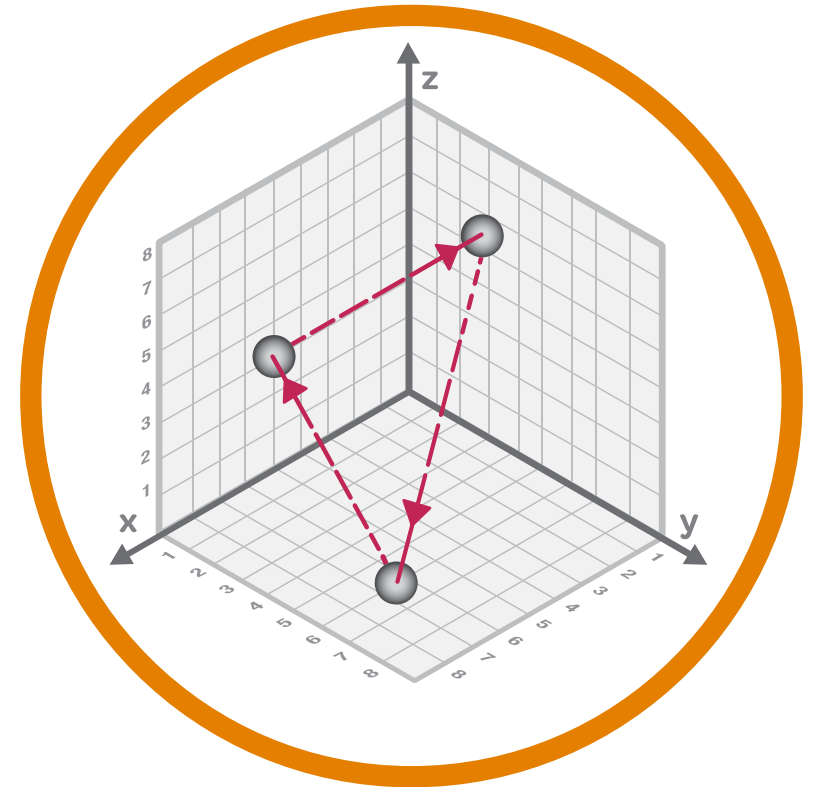


Advanced positioning

Although high performance positioning applications are a domain of servo drives with synchronous motors, asynchronous motors with variable speed drives offer performance that is sufficient for many applications. The function block extends the function of variable speed drives by adding a position control function.

Benefits

- > Reduce working cycle time by automated positioning with high precision.
- > Comparable positioning capabilities to a servo motor without the cost.
- > Reduce operator stress and fatigue that could lead to errors.
- > Automation of recurring sequences supports the crane operator.



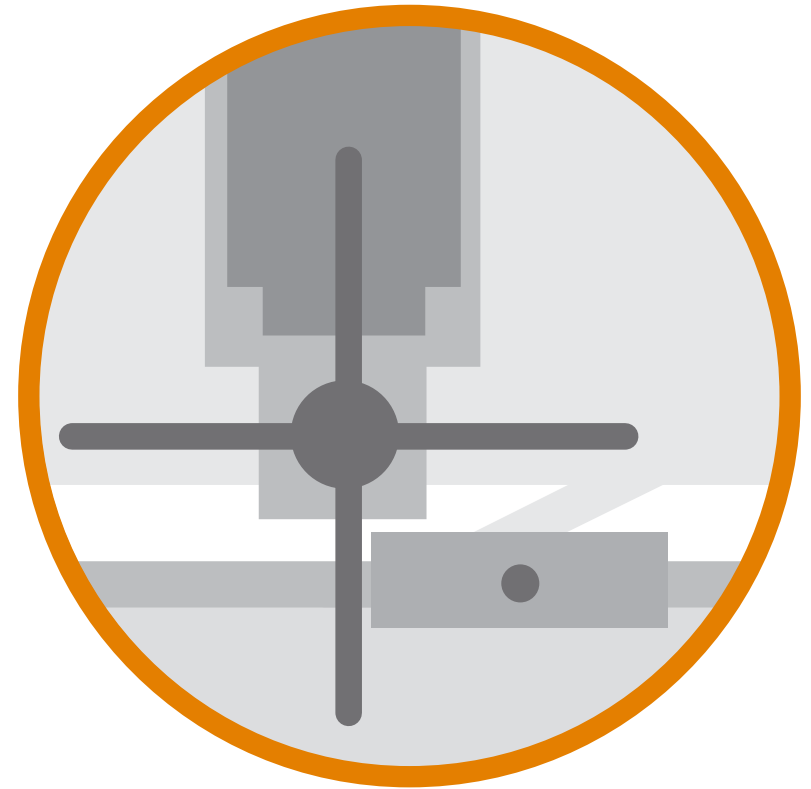
Advanced positioning

Increase protection of crane equipment and reduce risks

This function manages all possible axis including hoists and slewing for building cranes. It executes the stop and slow down point by sensor input or defines the location by a distance parameter. You can also use it as an anticollision function by using a photoelectric sensor instead of a limit switch.

Benefits

- > Limit the working zone.
- > Prevents breakdown or load dropping.
- > Prevents damage to crane equipment.
- > Saves commissioning time.
- > The limit switch status can be displayed on the HMI.



Limit switch management

Improve load positioning accuracy and increase crane efficiency while reducing risk

This function provides smooth and accurate movements on crane slewing to position the load precisely on the target. This function avoids jerking due to overtorque and inertia throughout the slewing movement.

Benefits

- > Reduce working cycle time and increase positioning precision by avoiding load sway.
- > Reduce mechanical shocks and stress on the crane mechanism and structures thanks to torque adaptation on slewing movement.
- > Prevent excessive and dangerous load swaying.
- > Reduce operator stress and fatigue that could lead to errors.
- > No additional sensors or external devices are needed.



Smooth slewing

Preventive maintenance and monitoring data logging of operating parameters

The monitoring data storage function is based on a logic controller for acquiring, recording, and providing warnings on relevant and critical issues for preventive maintenance purpose. It provides information on the working safety period of the gear box, improper crane operations, and important occurrences such as overload and overspeed.

Benefits

- > Maximum use of critical equipment such as the gearbox via automatic calculation of the working safety speed.
- > Prevents problems from becoming maintenance issues.
- > Reliable and up-to-date crane diagnostics through the historical data maintenance.
- > Saves maintenance time by determining the origin of the problem before solving it.



Monitoring data storage

Increase protection of crane equipment and reduce risks

Brake wear or handling excessive loads can generate load slipping, which can lead to an increase in load speed and associated risk. Load overspeed control is based on a sensor and a controller. When the nominal speed is exceeded, the controller must trigger an emergency stop and the function sends an alarm to control the situation.

Benefits

- > Prevent the load from falling.
- > Prevent damage to the gear box and motor.
- > A dedicated device is not required; the same controller can be used for several functions.
- > The most recent overspeed events, with time and date, are recorded as part of the preventive maintenance and monitor (ING).



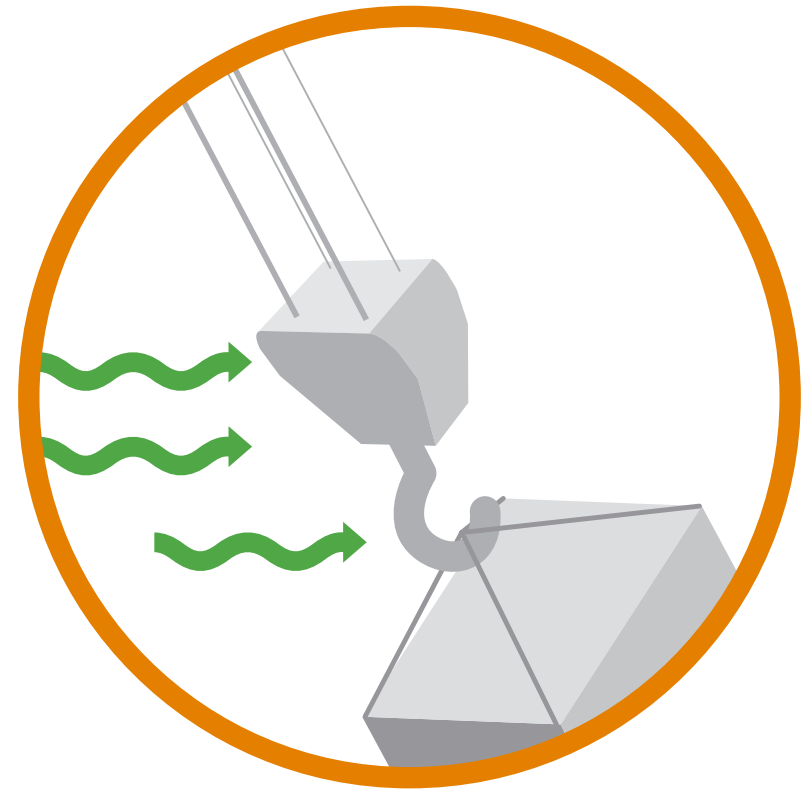
Load overspeed control

Detect high wind events

The wind speed control function constitutes a preventive measure against risk associated with strong winds. It is based on an anemometer and a controller that detect and send an output signal to inform operators that maximum wind speed has been exceeded to continue operations.

Benefits

- > Prevents the crane from toppling over.
- > Detection of lock or failure of the anemometer.
- > Crane control can be restricted to prevent the risk of unauthorised operation.
- > Adjustable filter time to prevent gusts of very short duration from triggering false alarms.
- > Warning and alarm set points configurable according to local regulations.
- > Anemometer with analogue or pulsed output is supported.
- > A dedicated monitoring device is not required; the same controller can be used for several functions.
- > The most recent excessive wind speed events, with time and date, are recorded as part of the preventive maintenance and monitoring.



Wind speed control

Increase productivity, protect equipment, and reduce risk

The speed optimisation function reduces the work cycle time on the hoisting movement. It allows operation at constant power in order to reach a higher speed according to the actual load. The rope slack function is used to prevent high speeds on the hoisting motor when the rope is slack. At the same time, it prevents overlapping of the rope on the motor drum when the handling tool has been set down and the rope is too slack to be unrolled properly.

Benefits

- > Reduce working cycle time for hoisting movements according to the weight of the load.
- > Limits the speed of the hoist when the rope is slack.
- > Protect the equipment by preventing overlapping of rope on the hoisting motor drum.
- > No additional sensors or external devices are needed.



Speed optimisation
rope slack

Improve efficiency of your grab while reducing stress on mechanics

This ready-to-use dedicated function block realises the grab function controlling the two drives of the hoisting system (Hold and Close). The best regulation mode is automatically applied according to requested Operation: Closing, hoisting with synchronisation, opening/closing the grab, etc.

Benefits

- > Save production time: efficient closing operation on material with less fatigue for the operator (operation control with a single joystick).
- > Increase crane life: reduce mechanical shocks and stress on the crane mechanism and structure (by virtual limit switches); less wearing of cable and gearbox due to optimised control.
- > Save design time: ready and easy-to-use full grab function dealing with the complexity of your crane; only some parameters to set.
- > Reduce your cost: drive I/Os are used as remote I/Os of the controller; optimise sizing of motors and drives due to torque sharing during lifting.



Grab control

Prevent risk conditions due to overloading

The overload function prevents mechanical overload for machine safety and durability. Taking into account the weight of the load through the hoisting drive's torque level, this function is able to stop the ascending movement in the event of an overload and lowers it until the load reaches the floor.

Benefits

- > Prevents the load from falling and/or the crane from toppling over.
- > Prevents damage to the gearbox and motor.
- > Event reset is automatically generated by torque measurement or by calculation of travel distance.
- > Tipping prevention.
- > No additional sensors or external devices are needed.
- > Full compliance to EN 15011.



Overload control EN 15011

Diagnostic coverage

The function block compares application signature and firmware version with a configured value to detect undesired changes in the program. It also watches executions of subprograms, actual cycle time of a cyclic task, and provides interface for cross-checking of two controllers. Internally, it tests integrity of variable memory and correctness of boolean and floating point operations.

Benefits

- > Not safety-certified logic controllers reach a diagnostic coverage superior to 60 per cent.
- > This function offers a highly competitive performance/cost ratio in complying to safety standards.



Diagnostic coverage



Hoisting control solutions

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