



Load Collision Prevention System

Improve safety while maximizing productivity

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Safe and efficient stacking operations

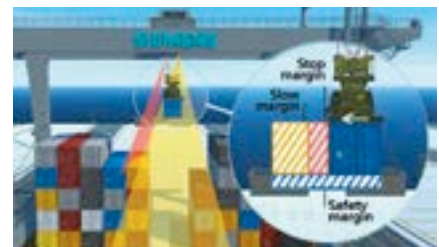
Safety in stacking is a key requirement for reliable operations. Siemens Load Collision Prevention System (LCPS) contributes to that safe distances are monitored in real time to avoid collisions and therefore reduce the risk of damage and consequently repair costs. Dynamically adjusted safety distances in X, Y and Z direction are monitored and integrated into the drive and control system in a safe way. The system utilizes the SIMATIC WinAC RTX platform which permits implementation of safety systems on the latest Siemens Industrial PC.

Siemens' LCPS reduces the risk of collisions by offering driver assistance especially regarding blind spots of manually operated cranes and supporting automated moves on automated cranes. The system enhances the safety, contributes for route optimization thus enabling an efficient workflow.

Productivity and availability

The system monitors the position of the spreader and the load. When an obstacle is detected, a virtual speed-dependent safety box dynamically restricts motions according to the defined safety margins. In order to reduce the risk of colliding towards the stack, the sway prediction is taken into account.

With this smart pendulum calculation, LCPS considers the residual sway and the stack gradient to define the safety margins around the load. This unique safety feature plays a key role in the output supporting the achievement of new standards in efficiency, productivity and availability of the crane.



Siemens Load Collision Prevention System contributes to safe, efficient and productive operations.

Load Collision Prevention System: safe, efficient and productive

Accurate position measurements

In order to support a constant workflow, the system calculates the position and speed of trolley, gantry and spreader. LCPS detects the position and travelling speed of the trolley independently. All distances between important reference points are calculated, synchronized and verified via two different measuring systems.

Besides identifying the position, LCPS also creates a stack area profile so that a safe height is calculated. The system safeguards that all measurements are done timely to allow collision avoiding measures.

Additional safety measure

In case a deviation from the expected status is detected, LCPS adjusts the control accordingly. Based on the safe margins, LCPS defines two safe distance thresholds to first slow down and secondly stop at a later stage.

An additional safety measure is activated if failures are detected. In that case, a safety stop will be initiated directly to the drive. The system automatically responds depending on the speed and position of the trolley, gantry and hoist.

Given the load sway due to movements, sufficient margin in slowdown will be taken into account to act safely under different circumstances.

Efficient workflow on every cycle

During trolley movement, LCPS detects the stacking profile and stores this in the system. The scanned area is then free to be used for running optimal paths in the successive cycles.

After a certain amount of cycles, the total stack profile is scanned allowing optimum path in the total area. When travelling over the stack, the profile is verified and updated to increase the

safety and the efficient workflow in container handling. LCPS continuously updates the stack-profile enabling collision prevention to be executed.

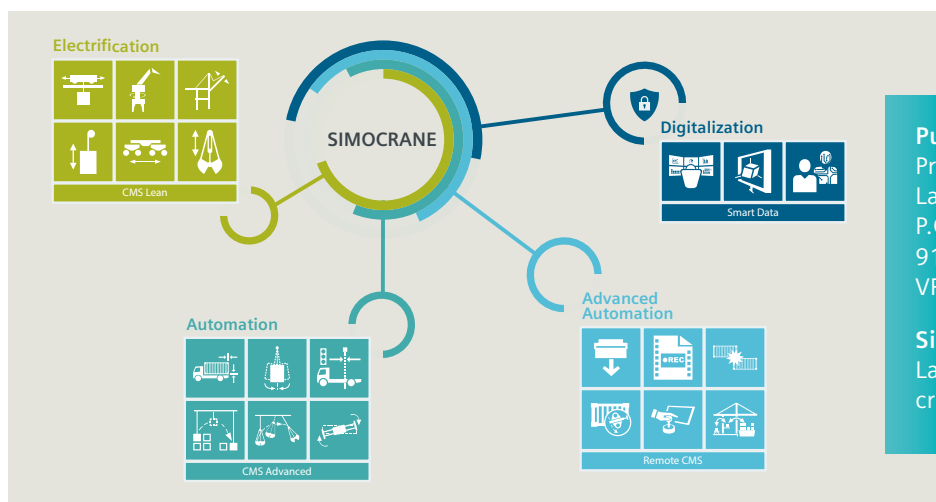
Benefits of movements monitoring

- Reduce the risk of colliding loads in a stack
- Increase productivity
- Reduce risk of damage and repair costs
- Elimination of downtime
- Easy to integrate: suitable for greenfield and brownfield projects
- No pre-scan required, operation can continue directly with the next job

LCPS: Typical Collision Scenarios



- 1) Normal parabolic movement
- 2) LCPS activates for bay smart slowdown
- 3) LCPS activates to prevent protruding box from adjacent bay
- 4) LCPS activates in case of misalignment



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