

Remotely controlled STS cranes

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Summary

The performance of STS cranes is a limiting factor in the achievement of maximum throughput in container terminals. The need for high performance has driven the recent rapid development of these cranes. Having the crane operator on board has become a critical factor; maintaining essential lines of sight and operating controls puts limitations on the location and position of the operator which can result in severe strain and fatigue. Also, since the operator's cabin moves with the load, there are restrictions on the rates of acceleration and deceleration, thus increasing cycle times.

ABB Crane Systems has considerable experience from having supplied more than 300 remotely controlled ASCs. Working in collaboration with Manzanillo International Terminal (MIT) in Panama, ABB Crane Systems has successfully applied this experience to an existing STS crane. This is the world's first remotely controlled STS crane.

Requirement

Despite many significant improvements to the design of operators' cabins there remain significant problems. In order to see the load at all times the operator has to lean forward and look down between his feet. This causes some discomfort and possibly strain. The operator is subject to constant movements, accelerations and decelerations of the cabin.

These factors cause discomfort and fatigue and affect the operator's performance. There is significant absence due to sickness. To avoid harmful effects on operators there are limits



Summary and analysis of last night's production using the Terminal View to provide both real-time and historical data.

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on the rates of acceleration and deceleration of the cabin, which leads to cycle times being longer than could otherwise be achieved. Safety of all crane operations is paramount. It is therefore necessary to ensure that any changes do not jeopardize safety and, where possible, improve safety standards.

Solution

Remote operation of the crane offers a complete and effective solution to the above needs. By operating the crane from a



Remote operation at Manzanillo International Terminal, Panama.

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Crane operation from a remote control room means improved working conditions for the operator's while allowing aggressive tuning of the crane.

remote location there is no compromise on the operator's posture and, in a well designed control room, the conditions minimize the effects of stress and fatigue. ABB Crane Systems' remote control station (RCS) was developed for ASCs and is well proven; it has an established layout of push button and joystick controls, camera screens and a computer screen. The layout of the RCS and the operator's chair are ergonomically designed to enhance comfort and performance.

State of the art camera technology is used to ensure that the operator has all views necessary for safe and efficient movements. Contact with personnel working local to the crane is through radio links, in the same way as from an on-board operator's cabin.

Further benefits

Working from a remote control station has many advantages beyond operator comfort and higher acceleration rates. All the operators can be located in one control room. Of course, operators will benefit from a more social environment and by grouping the crane operators more flexible routines and arrangements are possible, benefiting the operators and the employer.

It is anticipated that the control room will be located near to the terminal control room and that there will be improved communication between all of the personnel involved. Using cameras gives the operator access to views that are not available from the cabin. Thus it is possible to achieve higher levels of safety – particularly for those working on board ships.

With the operator no longer on the crane, more aggressive rates of acceleration and deceleration are permissible. This applies not only to the main traversing movements but also to corrective operations such as sway control and skew pendulum dampening.

These features add further to the savings in overall cycle times. The more aggressive ramp rates reinforce the benefits achieved by automation such as ABB Crane Systems' Automatic Container Landing System and Double Trolley Systems.

On new cranes built for remote operation, there will be no cabin and so a significant reduction in live loads is achieved. For future full-scale implementations, ABB will also deliver its new Terminal View solution which integrates real-time information from several levels of equipment and different suppliers throughout the terminal. In a large screen, multi-monitor environment, the Terminal View provides easy analysis of both overview and detailed information for operations as well as maintenance.

Implementation

ABB Crane Systems has undertaken many retrofitting projects on STS cranes and is therefore well aware of the need to minimize the period for which the crane is out of service. When an STS crane is out of service it also blocks access to the quayside. Therefore the project was implemented in two quite separate stages and the engineering and operating personnel were closely involved in the planning.

The two stages were:

- 1) Operation from a fixed cabin mounted on a crane leg
- 2) Operation from a remote control station.

In Stage 1 the operators worked from a stationary cabin which was equipped as a standard crane cabin but using cameras and screens. Thus the operators were in familiar surroundings but were controlling movements on the basis of camera images. Stage 2 left the cabin set-up all together and instead the operators worked from the remote control station located in the office area.

Results

The project was subject to continuous joint evaluation by ABB Crane Systems and MIT. The evaluation is still in progress but the project is already judged a success on the following basis:

- A basic objective was that with remote operation, cycle times must be no longer than was already achieved using operators in crane mounted cabins
- Reductions in cycle times have been achieved on a regular basis
- The operators are pleased with their new environment, with less physical strain
- Provided that these improvements are maintained, then the cost of conversion will have an attractive pay-back period

ABB Crane Systems is proud of the achievement at MIT and acknowledges the commitment and cooperation of the management and personnel of MIT.

ABOUT THE COMPANY

ABB is a leader in power and automation technologies that enable utility and industry customers to improve performance while lowering environmental impact. The ABB Group of companies operates in more than 100 countries and employs about 130,000 people.

ENQUIRIES

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