

The third element is the mobile inventory system. With all elements meshing, the ICTF has the most state of the art, real time inventory system found in today's rail industry. The key to maintaining this real time inventory is the data entry of inventory movement by yard hostling personnel through the use of mobile data terminals.

At the ICTF, all hostling tractors and yard check vehicles are equipped with mobile data terminals. These mobile data terminals (MDT's) are radio linked to a control unit located in the ICTF tower. Data is sent via micro-wave to the central computer located at SP's headquarters in San Francisco.

The need for accurate inventories is critical because:

- Reporting inventory with MDT's results in an accurate inventory.
- Reporting the inventory provides management with a tool to gauge ramp personnel activity and productivity.
- Inventory moves reported via MDT input updates a real time visual monitor used by the ramp manager to monitor hostler activity.

All inventory moves are recorded and stored in a file that provides a historical record to monitor hostler productivity.

The ramp manager is responsible for coordinating all the activity and ensuring that the plan is carried out. He provides the direction and computer input for the ramp crews.

With all elements and systems now functioning we feel that the SP's terminal inventory system at the ICTF sets the industry standards for maintaining a real time inventory and a managerial resource.

SEMI-AUTOMATED CONTAINER/TRAILER CRANES

BY

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Provincial Crane Inc.

In order to handle today's cargo at a competitive cost and in good time, new ways of handling the container had to be found, not only in the method of handling the container/trailer itself, but in utilizing the available yard area to the maximum efficiency.

The use of automated machines have been the mainstay of the auto industry, and only in the last 10 years has the automated function been considered in the Intermodal Facility. Automation involves the automatically controlling the operation of an apparatus or system powered by electricity.

What does automation do for the Intermodal Terminal?

It Speeds Up Container Handling

The use of semi-automation on the long-span container gantry cranes provides position operation functions such as X-Y positioning, computerized positioning/locating for containers, and inventory control.

It Reduces Operator Fatigue

With automation of functions of the crane such as BRIDGE, TROLLEY and SPREADER BEAM, the operator can be doing other jobs during the time spent traveling to the container.

The operator selects the container coordinates and the container size, starts the sequence by pressing the selector button and the crane then travels to the position without the aid of the operator. Positioning is accurate to plus or minus 1 inch.

It Reduces Container Damage

With automation, the acceleration and deceleration of the crane is controlled by the on-board computer, thus providing smooth operations. The cranes also have the feature of anti-sway reeving on the hoist which eliminates the sway of the container during movements of the crane.

It Reduces Maintenance Costs

Automation reduces operator abuse of the equipment, and along with the electric powered motors, the high cost of maintaining a diesel engine has been eliminated.

It Interfaces With Yard Computers

With the use of a radio link, the yard computer can talk to the crane computer, giving instructions on what container to select, etc. This feature gives the crane operator the required information on entry into the yard by the trucks. The type of information can be:

- container identification
- location of pick up point
- truck waiting area
- container storage location.

It Increases Equipment Life

Automation not only increases the productivity of the yard but also increases the operating life of the machine. Through the controlled movements of the crane, operator abuse can be virtually eliminated. Also, the use of electric drives, which have been used for over 70 years in the steel-making industry where high reliability is required, has eliminated high maintenance items.

It Reduces Land Utilization

The use of the semi-automated, container handling, long-span gantry crane has also reduced the land usage at terminals that have elected to automate the through-put handling.

The dead-land areas are the two runway rail supports only. On average this would amount to 6 feet per runway support. Cost comparisons can be made between the two runway rails for the long span gantry and the several heavy paved areas required to accommodate the conventional loading equipment.

Features for Automation of a Gantry Crane

The following items are an example of the features that have to be incorporated into the design of the gantry crane in order to have a solid, reliable base for using automation.

Fixed runway rails: The use of fixed runway rails provides the solid base for the bridge travel, which in turn relates to the structural rigidity. These features are the basis in providing the continuity required for an X-Y automated coordinate.

Solid steel rail wheels: The use of the solid-state rail wheels also eliminates the amount of surge movement of the gantry and provides the basic tool for monitoring the bridge travel.

Constant power supply: Having the constant power supply reduces voltage fluctuations and provides continuity for the computer control.

Stabilized reeving: This provides the geometric rigid mast that reduces the time required to spot a container after stopping the gantry.

Solid state drives: The solid state drives provide the interface between the encoders and resolvers used for tracking the movements and the computer for controlling the function.

Reliability: Reliability in the machine is required in the automated gantry so that coordinates can be fixed for an extended period of time without constant reprogramming.

Power

Automation requires that the equipment be run on electricity rather than the liquid fuels presently used in North American intermodal terminals.

With a constant flow of electrical power to the crane, the computer has a non-variable power flow. Another feature of the constant power is that the size of the motors are selected based on the requirement of the crane's duty, i.e., the horsepower required to give the speeds necessary for the crane to handle the terminal through-put can now be selected and incorporated in the design of the crane rather than the horsepower and speeds being dictated by the available out-put from the diesel generator.

Electric powered equipment can have a positive effect due to reduced noise levels, no use of liquid fuels, night operation in residential areas and reduced air pollution.

Electric powered container handling has been used in Europe for the past 25 years and has proved to be the way to handle containers in a heavily populated community, and to provide reduced costs of handling goods. The advantages of the electric powered machine is found in the operation, efficiency, cost, and life.

The electric powered machine also has the capability to be engineered to the requirements of the Intermodal Terminal so that the required duty cycle of the machine (crane), speeds, acceleration and durability are designed for the through-put.

Benefits of Automation

The automation of the equipment that we use to handle containers and trailers has produced many improvements in the operation of an Intermodal Facility. Some of the advantages are:

Anti-Sway Reeving

During the normal operating movements of the crane, the load is restricted from moving from side to side by the geometry of the hoisting ropes. This provides accurate spotting of the spreader beam over the load and reduces the time required waiting for the beam to stop swaying.

Summary

The automation of the motions of the crane (although the operator can manually override the automation by moving the master switches) provides a system that is better able to consistently position the crane quickly and accurately since the drives always operate at maximum rates of speed and stop in minimum distance during automatic moves. The drives are not limited by visual parallax problems, nor do they become fatigued. The result is that the automated container/trailer handling gantry crane can position itself over the containers with greater speed and accuracy than an operator could consistently provide.

TRANSPONDER/INTERROGATOR SYSTEMS

BY

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Introduction

Transponder/Interrogator systems operate by sending radio frequency signals between an interrogator/antenna and transponders which are attached to objects or in particular locations. Transponder antennas are internal to the transponder itself and interrogator antennas are external to the interrogator.