



POSITIONING THROUGH DGPS AND SATELLINE IN CONTAINER TERMINALS

DGPS positioning is a widely used technique in container yards, in harbour areas as well as in inland transportation terminals. SAVCOR ONE, member of the Finnish SAVCOR Group, has developed and is marketing worldwide an advanced container position information and terminal management system.

The SAVCOR concept rests on four basic corner stones: The DGPS positioning supplemented with dedicated position sensors, wireless communications, on-board digital maps in the container moving vehicles and effective information delivery and leveraging.



Accurate positioning

The SAVCOR Container Position Information System (C-PIS) is built of functional modules. The heart of the system is the AccuPack™ module for position determination. For the DGPS positioning, there is a GPS base station located centrally within the container storage area. Each straddle carrier (or any other type of container mover) operating in the yard is equipped with a GPS positioning unit and a SATELLINE-2ASxE radio modem. The base station communicates with the straddle carriers through the SATELLINE.

A basic GPS device is capable of determining the position of a container mover with an accuracy of 10-20 m. For the container terminal purposes this accuracy is, however, not adequate. Based on the known exact position of the base station, the DGPS calculates the position correction for each of the CHEs. This information is transmitted to the mover vehicles uninterruptedly (5/sec) through the SATELLINE. As a result, each carrier knows its location with an accuracy of 10-50 cm at any time.

Even the utmost precision achieved with the DGPS technique is not sufficient for certain container moving operations. The CHEs are therefore equipped with supplementary position sensors, which facilitate positioning of the carrier with a precision of a few centimetres.

From coordinates to user information

To perform the moving tasks in a container yard, the driver of a CHE needs to know the exact location where he or she is to deposit or remove a container. The DGPS coordinate information has therefore to be converted into a slot and row format. The current location of any container is visible on a display in the form of a digital chart. In order to save the bandwidth capacity and avoid unnecessary transfer of location information between the

dispatch centre and the vehicles, each carrier is provided with a data processor and digital map of its own.

Every movement of the carrier or transfer of a container is registered into the database of the C-PIS terminal management software. The position information not only serves the basic needs of the CHE driver. It also provides the dispatcher with a real-time view of the situation of the yard and the mover traffic. Logistic information about the containers is available as well to the end-users.

Radio modem network works independently

In a larger container yard, there are usually more than hundred mover vehicles working. As each carrier is equipped with a SATELLINE-2ASxE radio modem, there is an equal number of "slave" radio modems receiving uninterrupted position correction data from the "master" SATELLINE modem connected to the GPS base station. As the useful range of direct contact in a SATELLINE network is at least

several kilometres, one base station is normally sufficient to cover the entire container yard area.

For precise steering, the position correction for each straddle carrier is updated five times per second. Transferring this amount of data in the basic C-PIS communications network would be difficult and risky. The SATELLINE network is therefore kept completely separated from the rest of system communications.

By complementing the DGPS technique to a working positioning system, the SATELLINE radio modems provide a small but important link in the container transportation logistics chain.



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