INSIDER INSIGHTS DRY PORT GPS

EQUIPMENT TRACKING

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Background

Tracking of empty Container Handling Equipment and Reach Stackers to keep up with live operations and inventory management has always been of interest to managers of empty container depots.

However, given that the high stacks of empty containers can block satellite signals, can GPS equipment tracking and automatic container position reporting still offer value in these types of operations?



Working with a major empty container depot in Italy, the **Port Automation** team explore the benefits and issues around using GPS in challenging areas.

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Why GPS?



GPS has long been the cornerstone for Container Handling Equipment (CHE), providing up-to-date information about the location, speed and travel of handling equipment and where containers are picked up and set down.

With the increase in size and numbers of inland and empty container depots, could GPS technology be of use in this growing type of operation?

In this paper we explore the benefits that the implementation of GPS technology can bring to the operation of an empty container terminal, whilst also examining its limitations and cost-effectiveness.



Implementation best practice

Like all technologies, experience in implementation is a key factor in the success of any project. The **Port Automation** team have been implementing track and trace systems in container terminals for over 30 years and are one of the most experienced vendors in this sector.

In order to obtain the results in the following sections we have used our experience to configure GPS hardware to work in an optimal way for the implementation on a Reach Stacker, Front Loader, and Empty Handler.



spots and multipath

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General tracking



General position tracking in a container yard is an important part of being able to identify positions for container pick up and set down locations.

This plot shows the CHE moving around the yard.

As can be seen this did not present any issues.



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GPS-drift



GPS-drift over time is a factor that should be considered as the consistency of the reported positions are a key factor to ensure the positions reported remain stable.

In this real-life test an empty handler is parked against a 6 high container stack for several hours with little or no position drift.

The maximum deviation recorded during this time was +/- 38cm.



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Container position accuracy



When containers are positioned in the yard a key part of the success is the ability to automate the position reporting - it is also important to know the level of confidence in the position reported.

Our systems report not only the position but also the confidence level along with several other metrics.

We looked for some of the most extreme cases and tested the accuracy of the positions reported.



All the positions were one high (grounded containers) in a stacking area, including 8 high containers on all 3 sides.

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The position accuracy is good and can identify container locations for the put-down and lift automatically.





The system also maintains the accuracy on the approach to the stack location.

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Other metrics



The equipment mounted system also produces vehicle speed, a height calculation and a bearing (direction of travel).

These are all useful metrics that not only assist in the location of the containers in the yard but also general equipment monitoring for safe use.

This actual operational plot provides the vehicle speed shown by colour coded tracks.

In some instances, it is not possible to mount the GPS antenna directly over the container spreader. In this case the offset and direction are calculated by the system to maintain the position accuracy of the container locations.



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Summary



Terminals looking to improve their operational efficiency by automatically identifying container locations placed by empty handlers and reach stackers can now do so.

The systems implemented will dramatically reduce the amount of manually entered data, time spent typing and confirming container moves and consequently data entry errors.

Key benefits:

- Reliable equipment tracking
- Remove data entry with automated position capture
- Accurately identify container locations

Different sites have different requirements. If you would like to discuss your site requirements and discuss the results you should expect, please feel free to contact us.