



Absolute Position Measurement for Ship-to-Shore Crane Trolleys

The challenge

Rotterdam ShortSea Terminals B.V. (RST) operates one of Europe's largest short sea shipping container terminals. To ensure smooth, problem-free loading and unloading of the sea and inland ships that dock at the Port of Rotterdam, crane operators of Ship-to-Shore cranes need to know the exact position of the trolleys. To date, the position of the crane trolleys has been measured with an encoder system that relies on magnetic reference markers, a system that has proven to be high-maintenance. Complicating this approach even further is the fact that transmission and conversion of the measurement data is susceptible to interference.

The solution

In contrast to encoder systems, the Symeo LPR®-1DHP wireless sensor solution contains no movable parts, making it free from wear and tear. The centimeter-precise positioning of the crane trolley requires only two Symeo sensors. One device is installed on the crane trolley and another on the end of the jib. The system measures the signal travel time of a 61 GHz radio signal to determine the distance between the two sensors in real-time. The measurement data is fed directly into the RST network via a standard TCP/IP interface.

The project's success

RST has been utilizing the Symeo wireless sensors, which are based on Symeo's patented LPR® technology, since August 2013. Costly crane downtime due to missing measurement data, as well as the labor-intensive maintenance, is meanwhile a thing of the past. After initially equipping one crane with the Symeo technology, plans are in place to retrofit a total of 11 cranes at the company's own terminal and at a terminal operated by a subsidiary.

Reliable and maintenance-free position determination thanks to LPR®

Stretching across 46 hectares, RST operates a port facility larger than 143 football fields. The Netherlands-based terminal operator handles 95 percent of the short sea shipping traffic at the Port of Rotterdam. Since space is at a premium at the container terminals, room for ships and cranes along the dock is limited. That makes quick loading/unloading processes and short transit times a prerequisite for efficient terminal operation. In order to unload the containers from the ships and set them down on open slots on the dock with centimeter accuracy, the crane operators need reliable and precise information regarding the position of the crane trolley.

To date, RST has utilized an encoder system with magnetic reference markers to determine the position. Magnetic strips located along the length of the stationary rails are scanned by a reader installed on the movable part of the crane trolley. The problem: the system frequently requires servicing and some spare parts can no longer be ordered. Furthermore, the transmission and conversion of the measurement data is interference-prone. This leads to downtime and idle container cranes.

The Symeo wireless sensors address this issue by enabling maintenance-free positioning of the crane trolley. One pair of wireless sensors determines the complete 2D position of

the trolley in real-time. The fault-tolerant wireless technology delivers positioning information that is accurate to 1 centimeter. The data is then transmitted to an existing system using a standard TCP/IP interface. „Because the Symeo sensors provide us reliable and easy-to-use information about the position of the crane trolley, the quality of our loading processes is at an all-time high,“ says Cees van Pelt, Manager Technical Department and Projects.

Robust wireless sensors

The 24 x 7 terminal operation means the loading processes have to be carried out regardless of the season or weather conditions. Unlike optical systems, the radio frequency-based LPR® technology is impervious to weather conditions, dirt and grime and does not suffer from wear and tear. The Symeo products thus contribute to reliable around-the-clock terminal operations. „Because the Symeo devices are extremely robust, we can reliably determine the position of the crane trolley without costly maintenance and cleaning,“ explains Niels Hansen, who is responsible for the area of software and automation.

The LPR®-1DHP wireless sensors, which can be quickly and easily installed on existing machinery, have proven their worth for several years on different types of cranes in a wide range of industries.

Rotterdam ShortSea Terminals B.V.

Rotterdam ShortSea Terminals B.V. operates one of Europe's largest short sea shipping container terminals. Key services include container transshipment and operation and maintenance of the terminal situated at the Port of Rotterdam, where it handles 95 percent of the facility's short sea traffic. To help customers transport goods to destinations all across Europe and North Africa, RST offers a strategic location with connectivity to sea and inland waterways and excellent links to road and rail networks.
www.rstshortsea.nl

Symeo GmbH

Symeo GmbH develops and markets systems for precise and contact-free distance and position measurement, as well as full-scale anti-collision solutions for cranes, industrial vehicles and other transport methods. Symeo products are robustly designed and well-suited for applications in harsh industrial environments indoors and outdoors.

Symeo's patented LPR® offers a wireless and real-time system for precise positioning and distance measurement that is ideally suited for industrial applications. Symeo also provides industrial GNSS receivers that can be combined with LPR®, enabling highly available and precise positioning, even under the most adverse conditions and in areas with limited GPS availability.

Symeo systems can be used regardless of vehicle or crane type, making them particularly suitable for upgrading existing systems. Based on its many years of experience, Symeo also provides system planning, integration into existing crane and vehicle control systems, and development of customer-specific data communication concepts.

Symeo delivers to end customers, system integrators and OEMs, and has local contractors for sales, service and planning all over the world.

Facts & Figures

- Reliable real-time measurements via wireless technology
- Precise position determination (+/- 1 cm)
- Easy data access via the sensors mounted on the jib and crane trolley
- Maintenance-free
- Easily installed on any types of cranes
- Weather/dirt/vibration resistant
- Easily retrofitted

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