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Intermodal Terminals
Marco Polo Common Learning Project

Positioning of Mobile Cranes in Terminals

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Rail Cargo Austria

2010-11-09
Chart 1

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Terminal Neuss

Inland trimodal terminal

Area 133 000 m^2.

2 cranes, 8 reach stackers

Empty container are stacked up to 5 high.

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Chart 2

Symeo - Absolute Positioning

Terminal Wels

Inland gateway-terminal

Area 110 000 m²

6 Tracks a' 580m

2 cranes, 5 reach stackers

High percentage rail/rail handling

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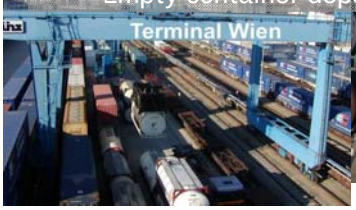
Chart 3

Symeo - Absolute Positioning

Terminal Wels and RCA Terminals

Challenges:

- Small and medium sized terminals with different and/or older types of handling equipment.
- High part of reach stacker manipulation
- Different types of loading units.
- Empty container depot functions



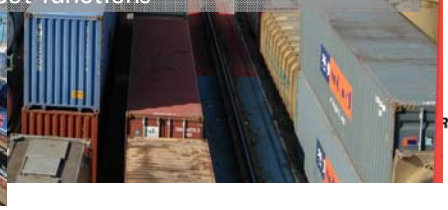


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Chart 4

Terminal Neuss

Challenges:

- Historical developed terminal layout with different locations.
- High part of reach stacker manipulation
- Different types of loading units
- Empty container depot functions as a very important part of the business model.

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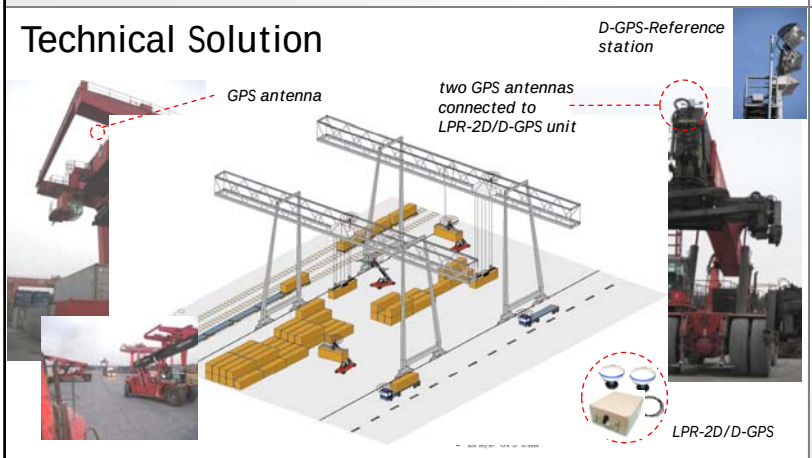
Chart 5

Technical Solution



- Tracking all container movements and positions by continuous position measurement of all cranes and reach stackers on the yard.
- D-GPS is applied as positioning accuracy is sufficient and satellite signal is uncompromised.
- The LPR-2D option with local transponders enables tracking in shielded and indoor areas to provide seamless position information

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Chart 6

Positioning Equipment Reach Stacker

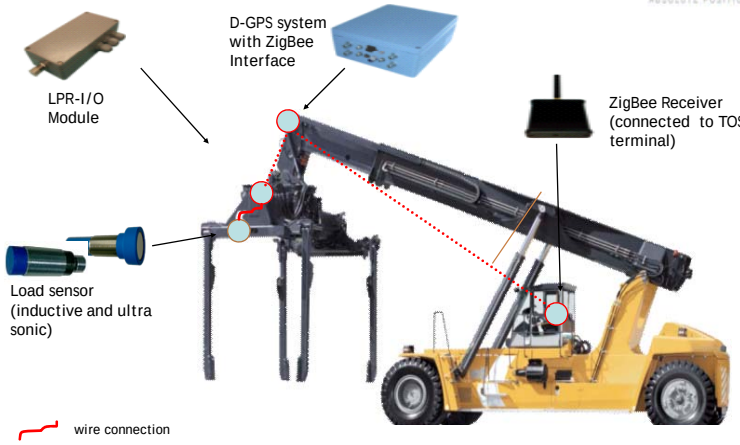

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Chart 7

GPS Antenna - Location

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Chart 8

Positioning Equipment Cranes

- Position of crane via D-GPS
- Trolley-position via LPR
- Wireless comm. Between components

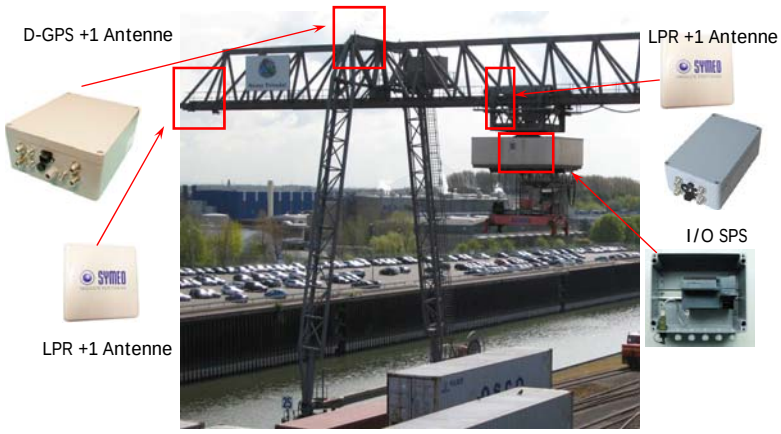

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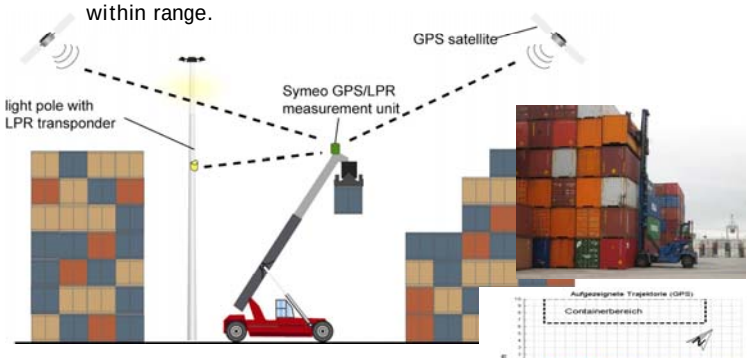
Chart 9

Solution for underdetermined GPS Positions

Problem: Not enough (<4) satellites or LPR transponders (<3) for each system within range.



Solution:

- Symeo Sensor-Fusion combines existing satellite and transponder signals to determine the dynamic position

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Chart 10

Status of the projects

- Neuss Trimodal:
  - Test trails with additional sensors for poor satellite visibility 2010.
  - Implementation of the system including existing portal crane together with new Terminal Management System beginning with 2011.
- RCA Wels / RCA Terminals:
  - Positioning system incl. extended Terminal Management System in operation since 11/2009.
  - Roll out to all other terminals of RCA-Group (incl. Budapest) planned up to 09/2011.
  - Pilot installation of Empty Container handling equipment during system implementation in Wolfurt 02/2011.

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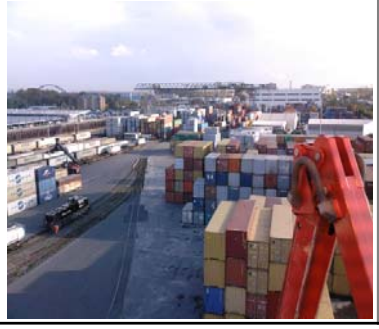
Chart 11

Thank You for your attention …



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