

Port Planning for the 21st Century

Challenges in Container Terminal Planning

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Overview

- Introduction
- Principles of Container Terminal Planning
- Current Challenges
 - Berth
 - Yard
 - Gate – Rail
- Summary



INTRODUCTION

- Disclaimer: view from the “coalface”
- 20th vs. 21st Century Challenges?
- Drivers of innovation in Planning:
 - Larger vessels
 - Traffic congestion at the hinterland interface
 - New Technologies (e.g. electrification, clean fuels, automation)
 - Environmental considerations (dredging, emissions)
 - Security Considerations (ISPS, RPM, VACIS)
 - Volume growth => Need for space



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Container Terminal Components

- Berth
- Yard
- Gate
- Rail yard
- Buildings
- Auxiliary functions



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Principles of Container Terminal Planning

- Capacity
- Productivity
- Balance
- Flexibility



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Flexibility

- Future proofing
- Pavement and infrastructure should accommodate different storage modes and layouts
- No rigid obstacles to expansion
- Layout should allow redundancy and easy circulation
 - Hatch storage
 - By-pass lanes
 - Turning radii
- Capacity vs. Productivity trade-off



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Challenges to Planners: Berth

- 18,000 TEU
- LOA: 400m
- Beam: 59m
- 23 cont. wide
- 10 cont. on deck
- Draft: 14.5 m



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Challenges

- Physical Dimensions
- **Productivity demand:** “6000 moves in 24 hrs” => **250 mph** average gross vessel productivity
- **Peak storage demand:** @50% imports/exports split and 1.65 TEU/box => **~5000 TEU off the vessel**



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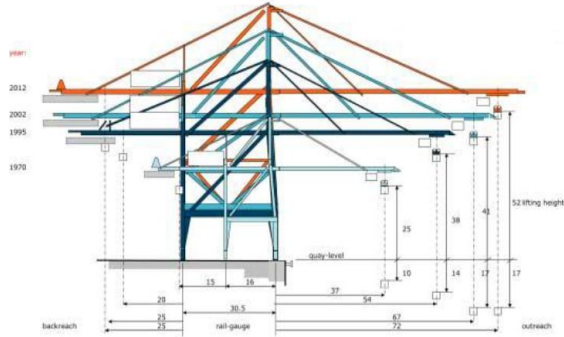
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Some tools available

- Crane dimensions
- Twin/ tandem spreaders



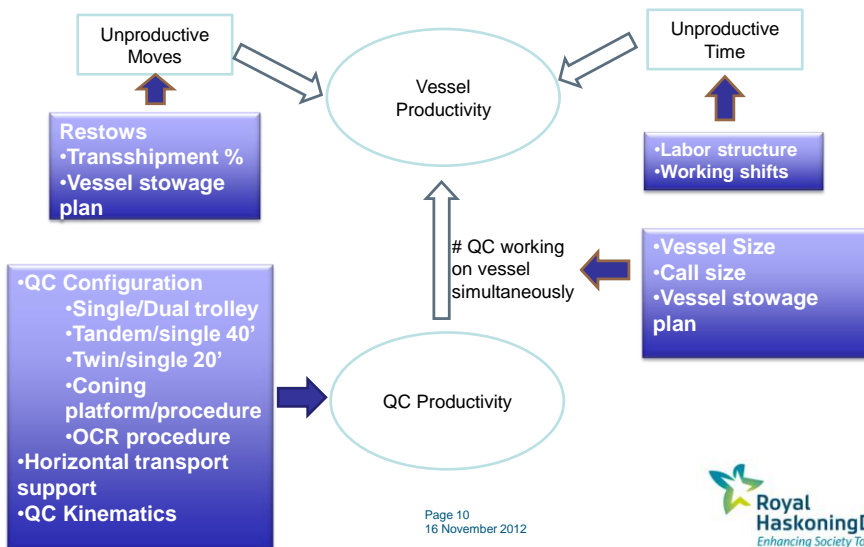
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Factors affecting productivity



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Not all 6000 moves are the same

- Gateway ports (e.g. LGW, Felixstowe)
 - Last port of Call (e.g. POLB/LA, Gdansk)
 - Transhipment terminals (e.g. Algeciras)
- } Similar Vessels
- Differences in:
 - Exchange per call
 - Stowage plans
 - TEU/box ratio
 - Full/Empty ratio
- } % Tandem lifts
% Twin lifts
Crane intensity
- **Planner has to advise on:**
 - Crane configuration
 - Horizontal transport and transfer points
 - Platform position, etc



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Challenges to Planners: **Yard**

- **Main Challenges:**
 - High demand on peak storage capacity and yard productivity => Horizontal transport has to avoid traffic jams
 - Expanding Terminals do not have the optimal space for expansion
 - Automated/ manned handover zones
 - Planning for the file cycle



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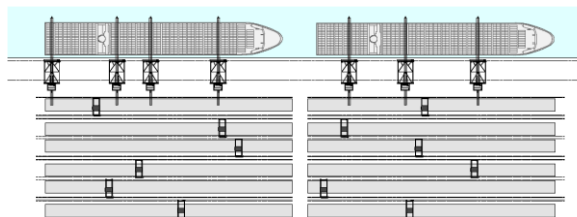
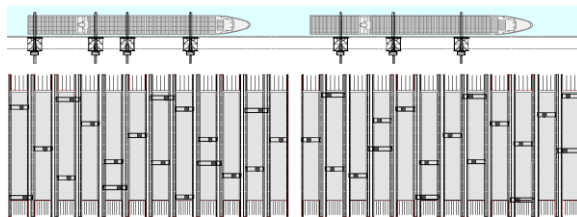


- Good News:
 - Manned Handling Systems are standardized
 - Automated Handling:
 - some working precedent
 - more off-the-self solutions
 - more equipment supplier choice



Challenges to Planners: Yard

- Layouts:
 - Gateway cargo:
Perpendicular
to quay
 - T/S Cargo:
Parallel to quay



Challenges to Planners: Yard

- However:
 - Available expansion shape in G/W Terminal does not have the required depth => **Planner needs to work out a layout with acceptable and uniform productivity in a limited space.**
- Other challenges:
 - RTG Electrification:
 - Cable
 - Busbar
 - What about Flexibility in automated terminals?
 - Clean fuels (batteries, cold ironing, LNG bunkering)
 - Security
 - Container weighing



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Challenges to Planners: Hinterland interfaces

- **Gates** – 20th Century challenges:
 - Customs working hours
 - Manual seal inspection
 - Modulation of traffic flow
 - Security inspections
- **Rail yards:**
 - Automating the loading and stripping of the trains
 - Schedule reliability and interface with yard
- **And the list goes on...**



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How to respond to these challenges?

- Advanced tools:
 - Queuing Theory
 - Simulation
 - Emulation

But first of all, the planners have to understand their Clients' needs

No two sites are the same, copy and paste does not work



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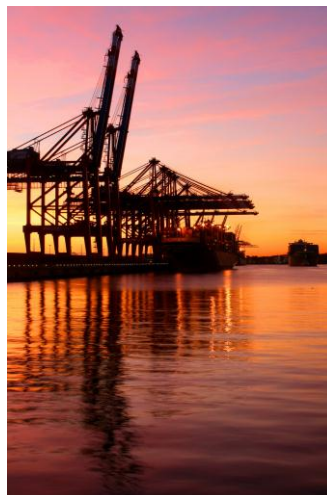


Conclusion

Continuous changes in:

- Cargo flows
- Environmental and Security Conditions
- Technology
- Procurement and project packaging

keep Container Terminal planners busy.



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