Terminal Automation
Lifting the Industry to the Next Level

Bart Vermeer
Sr. Manager Terminal Automation
Moffatt & Nichol at-a-glance

International Company
Headquartered in Long Beach

1945 Founded in Southern California
29 Offices Worldwide
Serves both public & private sectors

600+ Employees
450 in Maritime & Port-related work
8,000+ Projects
85% are Maritime/Port Work

90% Repeat Business
Marine & Port Facilities
Ranked No. 2 ENR Top 500
Container Logistics
The customer

CMA CGM to deploy six 18,000-TEU ships from Asia to West Coast

CMA CGM plans to upgrade a trans-Pacific service to the West Coast by deploying six ships with capacities of 18,000 twenty-foot-equivalent units, starting late May, a bet that container terminals can handle the largest mega-ships to call the U.S. and that volume will steadily grow.
“Since 2007 the ship size in the Asia-Europe trade has effectively doubled. We used to have 6,500TEU being the workhorse, now it’s the 13,000TEU and larger ships which are the workhorses. **Our point is simply that port productivity has not doubled since then.** While there has been improvement in productivity, we are spending more time in port because of bigger ships.”

*Søren Skou, CEO, Maersk Line*
State of containerization

- State of containerization
- Volatility in investment climate
- Environment, emissions (CO2)
- Growing container volume
- Bigger ships
- Alliances and service consolidations
- More focus on safety
- Increased levels of security
- Pressure for higher vessel productivity
- Volatility in investment climate
- Volatility of fuel prices
- Rising cost infrastructure development
Bigger vessels, what is the limit?

Possibly this is about maximum achievable berth productivities...

*And not about the technical vessel design challenging or nautical restrictions*

Ultra Large Container Vessels are not the largest ships ever built.

Ultra Large Crude Carriers built in the 1970s were larger...

All those were scrapped years ago, some after less than a decade of service.
Terminal Design
Lift the industry to the next level

To address

• The voice of the Customer
  • Berth productivity of 250 moves/hr.
• Safety
  • Reduce LTIF by separating man and machine.
• Sustainability
  • Meet requirements to win concessions. Electrification and densed operation.

Automated terminals designs can address those items very well,

But how to turn design into reality?
Integration by design

- **Process**
  - Design is based on an *optimized* process.
  - Each main process is described and it drives the design.

- **Blocks**
  - Breakdown to manageable entities – “building blocks”
  - Defining functionality of each block.

- **Elements**
  - Define and specify the elements and interfaces.
  - Who communicate to who about what data.

- **Integration**
  - The logical result of building up the elements into process building blocks and by putting these together into a working process.
Design of automated terminal

- If you don’t design for high productivity you will not reach high productivity.

- How much innovation are you willing to take in the project.
  - Proven technology vs innovation
  - Track record of the vendor
  - Track record with integration between vendors

- Phase promising innovations.
The integration puzzle
Automated Yard

- Euromax, Rotterdam – Two Per Block
- CTA, Hamburg – Mother Child Concept
- RWG, Rotterdam – Side & End loading
- Flavors
- AWG, Antwerp – Auto Truck Handling
Automated Horizontal Transport

- AGV –
  - Coupled operation
- L-AGV –
  - Semi-Coupled operation
- Automated Shuttle Carries
  - uncoupled operations

Conventional AGV (Toyota)

Autoshuttle by Kalmar

Full Electric Lift AGV (GPT)
Automated Vessel Handling

Robotized 2nd trolley
Auto Lashing System
Automated Horizontal Tr.

Remotely Operated
Automatic Flight
Sway/Skew Control
Crane OCR
Automated Gate

• The most mature automated process at terminals today

• Bring it to the next level
  • No people in the gate, increasing safety
  • Guide truckers over the terminal using their smart phones
  • Integration with Truck Appointment system
  • Integration with Auto Truck Handling (ATH)

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Bart Vermeer | Senior Manager, Terminal Automation | Moffatt & Nichol
Automated Rail Handling

- Automated rail cranes are out there
- Technically very similar to ARMG in the yard

Challenge:
- How to avoid RGC running over people working between the rail tracks
Simulation and Emulation

Design

Applications & IT

HW

Equipment

Civil

IT Network

Programming

Lab testing - emulation

Integration testing

Process flow testing

Volume testing

Construction

Manufacturing

Factory testing

Site testing

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