



Steven Deutsch, Port & Technology Conference March 22-23

Automation from ship to gate

Safer, greener and more productive

Automation from ship to gate



Crane automation



Automated handoff



Gate automation



Control room and remote operation



Megaships are here

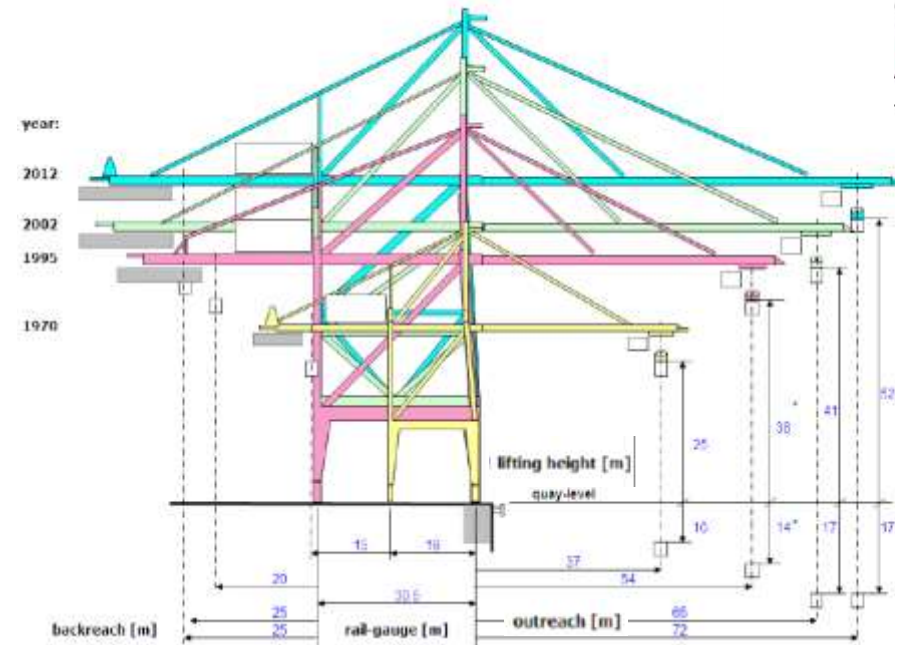
The industry drives automation



- World record load 18601 TEU
- 36 additional 14 000+ TEU ships to be delivered 2016

What drives the business?

Bigger impact from ship size than volume growth



- Only 1% increase in worldwide container handling 2015
- Doubling of average ship size over a 5 year period requires bigger, more efficient cranes and terminals

Recent automation projects

Recent automation projects

Large fleets of automated cranes in Rotterdam & Busan



Rotterdam Maasvlakte

- Rotterdam, Maasvlakte: in total 152 cranes
 - Euromax (HPH): 76 cranes
 - APMT: 60 cranes
 - RWG (DPW): 16 cranes



Busan New Port

- Busan New Port: in total 189 cranes
 - Hanjin: 54 cranes
 - Terminal Link: 53 cranes
 - DPW: 71 cranes
 - PSA: 11 cranes

APMT Maasvlakte 2 Rotterdam

Eight automatic STS cranes and 48 ASC



- All STS and stacking cranes operated remotely from the control room located in the main building outside the terminal fence
 - STS: one operator per crane
 - ASCs: two operators supervise the whole fleet of stacking cranes
- Intermodal cranes equipped with automation and enabled for remote operation

DP World Jebel Ali, T3 in Dubai

19 automatic STS cranes and 50 stacking cranes



APMT – Lazaro Cardenas, Mexico

Automation in Central America



- A green field terminal with
 - 7 STS cranes
 - 22 ASCs (end loading type)
 - 2 rail gantry cranes
 - Horizontal transportation: shuttle carriers

SSA – Tuxpan, Mexico

Automation in Central America



- A green field terminal with
 - 4 STS cranes
 - 8 ARMGs (cantilever type)
 - Stacks oriented perpendicular to the quay
 - Horizontal transportation: terminal tractors and chassis

Automated handoff with OCR

OCR for automated handoff

Total terminal coverage



Gate OCR



Crane OCR



Rail OCR



Exception management

Stacking crane automation

Stacking crane automation

Two types



- Cantilever
 - Transfer area alongside the block
 - Horizontal transportation by chassis



- End loaded
 - Transfer area at the end of the block
 - Horizontal transportation by the cranes

Stacking crane automation

Handling of horizontal transportation



Stacking crane automation

Automatic truck handling on landside transfer area



- Verification of truck driver out of cab before load/spreader is going below safe height
- Truck driver shall have access to E-stop
- Truck driver verifies successful
 - landing, all 4 corners of container rest on trailer
 - lift off, no twistlock stuck



Automating container terminals

Safer, greener and more productive



Predictable production
Just in time
Steady smooth pace
Improved safety
Environmentally friendly
The way of the future

Case: Long Beach Container Terminal

Long Beach Container Terminal



Long Beach Container Terminal

The biggest terminal of the area...



- ...with 10% of the capacity of the area
- 14 STS cranes
- 70 ASCs
- 5 Intermodal Yard Cranes
- (55 mph sustained for a 8 hour period utilizing 19 AGV's)

Case: MIT Panama – modernization of terminal capacity

The first automated cranes in Central America

SSA – MIT, Colon Panama ARMGs



Six ARMGs operate alongside RTG fleet

Introducing ASCs in an existing terminal

MIT, Panama



Modernization of terminal capacity

MIT: Crane operators Safe, Ergonomic environment



Fully automatic cycle allows the operators to handle multiple tasks making operator's role more versatile

Modernization of terminal capacity

MIT: Terminal Tractors / Fencing



Crane automation today

STS automation



- Automation - sway/skew/path control
- Automatic/guided landing on lashing platform/vehicle/quay
- Automated handoffs by means of OCR, vehicle identification and process integration
- Higher hoist/trolley speeds
- Remote operation
- Tandem/double hoist operation
- Double trolley or other means of decoupling with vehicles

Remote STS operation

Benefits of automation and remote control



- Safer working environment – humans separated from big machines
- Improved occupational health
 - No exposure of operators on braking/acceleration
 - Reduced or eliminated headaches, pain in the neck and back
 - Shift easily divided into shorter working slots and several breaks (e.g. 2 hour working slot per operator then break)
- Team work and collaboration

STS automation

Remote STS – a new way of operating cranes



- Modern and ergonomic Remote Control Station for operators
- Control room design
 - Optimized control room layout
 - Operator alertness solutions
 - Lighting and noise control solutions

Automated rail and intermodal facilities

Strengthening the chain from ship to gate and rail



- Rail and intermodal operations are becoming similar to yard operations
- Operation based on work orders from the terminal operating system (TOS)
- Automated cranes and automatic container hand-offs
- Remote supervision
- Based on same technology as automation solutions for stacking cranes

Intermodal yard crane automation

Order	Port/operator	Qty	Automatic sequence	Automatic landing	TOS connection	Remote control	Crane mfg
2005	Rotterdam/HPH	2	Yes				ZPMC
2007	Busan/DPW	2	Yes				ZPMC
2012	London/DPW	3	Yes				ZPMC
2012	Rotterdam/APMT	2	Yes	Yes	Yes	Prepared	Künz
2012	Rotterdam/DPW	2	Yes				ZPMC
2013	Lazaro Cardenas/APMT	2	Yes				ZPMC
2014	Long Beach/LBCT	5	Yes	Yes	Yes	Prepared	ZPMC
2015	Vancouver/GCT	8	Yes	Yes	Yes	Yes	Künz
		26					

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