

SHOW CASE:

SECURING THE GO-LIVE OF
KOREA'S FIRST AUTOMATED
TERMINAL

BY PROVIDING A

HYBRID TEST ENVIRONMENT



The Team



Prof. Dr. Holger Schütt

MD, akquinet port consulting
Over 30 years of port, terminals,
automation and simulation
experience



Chad Lee

Founder of piscrosoft Inc.
System integrator for
maritime IT



Sunil Kim

Automation Solution
Part Leader of
Dongwon Global
Terminal Busan

AKQUINET PORT CONSULTING

– industry experts and solutions



AKQUINET PORT CONSULTING

TOS



Implementations of Terminal Operating Systems - TOS- and project management for port logistics

Consulting



Industry experts
Port IT landscaping
Port and Terminal Consulting
Terminal Audit
Simulation studies

CHESSCON

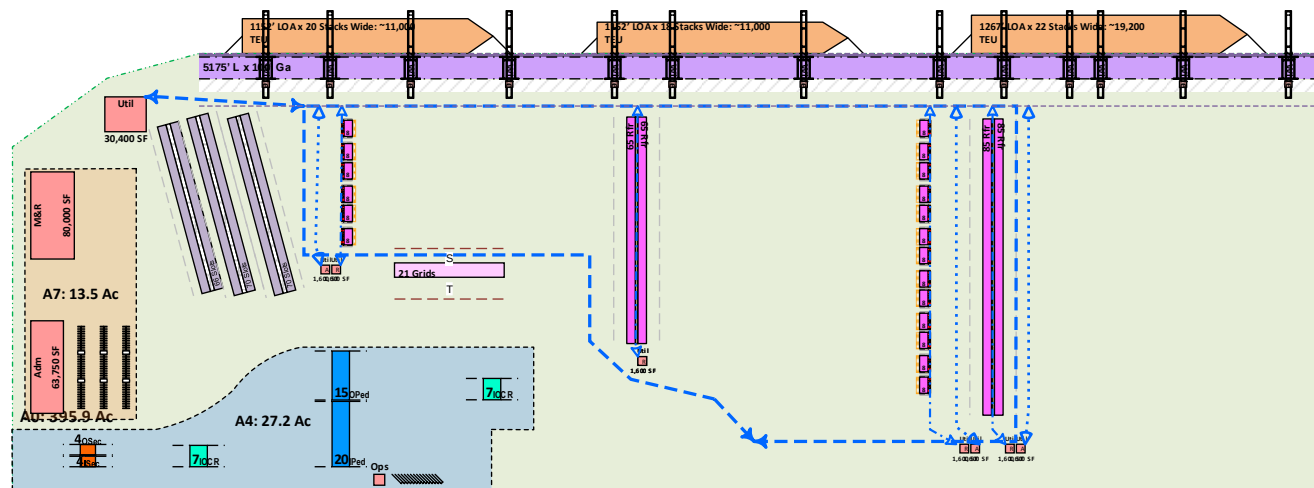


CHESSCON simulation systems for terminal design and evaluation; investment planning

CHESSCON Digital Twin

CHESSCON emulation systems for terminal operations, TOS optimization and training





Block Name	A0	A1a	A1b	A2a	A2b	A3a	A3b	A4a	A4b	A5a	A5b		
ElecA	0	0	10,058	10,058	10,058	10,058	10,058	10,058	10,058	10,058	10,058	Ring Main	
ElecB	0	0	734	734	2,339	2,339	2,339	2,339	3,892	3,892	3,892	ASC Distribution	
ElecC	0	0	1,882	1,882	3,504	3,504	3,504	3,504	5,079	5,079	5,079	Reefer Distribution	



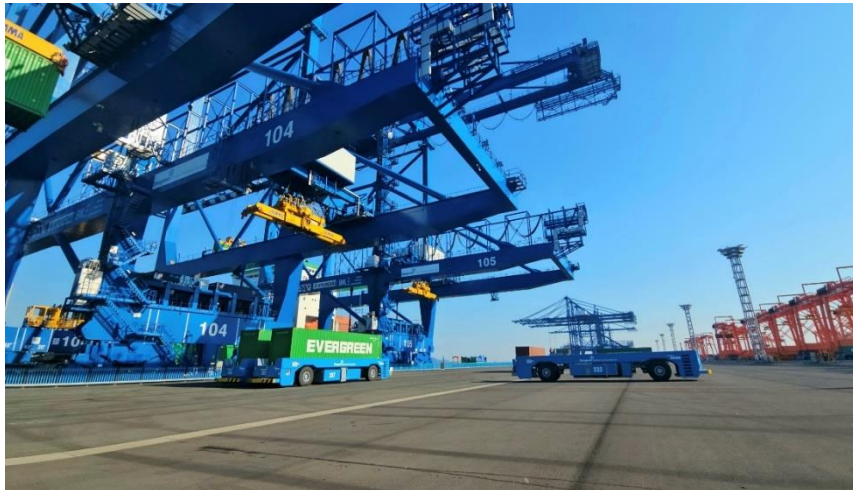
DGT

Current state and DGT's Roadmap
(Sunil Kim, DGT)

1. DGT Overview

■ Overview

Company Name	Dongwon Global Terminal Busan Co., Ltd.
Address	393, Yeondo-dong, Jinhae-gu, Changwon-si, Gyeongsangnam-do, Republic of Korea
CEO	Kim, Chang Hoon



2. Location



3. Facility



Class.	Phase 2-5	Feeder	Phase 2-6	Total
Berth length	1,050 m	385 m	700 m	2,135 m
Yard Area	837,248 m ²	46,195 m ²	523,205 m ²	1,406,648 m ²
Yard Capacity	12,474 TGS (64,604TEU)	-	6,654 TGS (36,549TEU)	19,126 TGS (101,153TEU)
Reefer	2,100 Plugs		1,700 Plugs	3,800 Plugs
Water Depth	Over 18 m			
Annual Volumes	4,500,000TEU			

4. Equipment

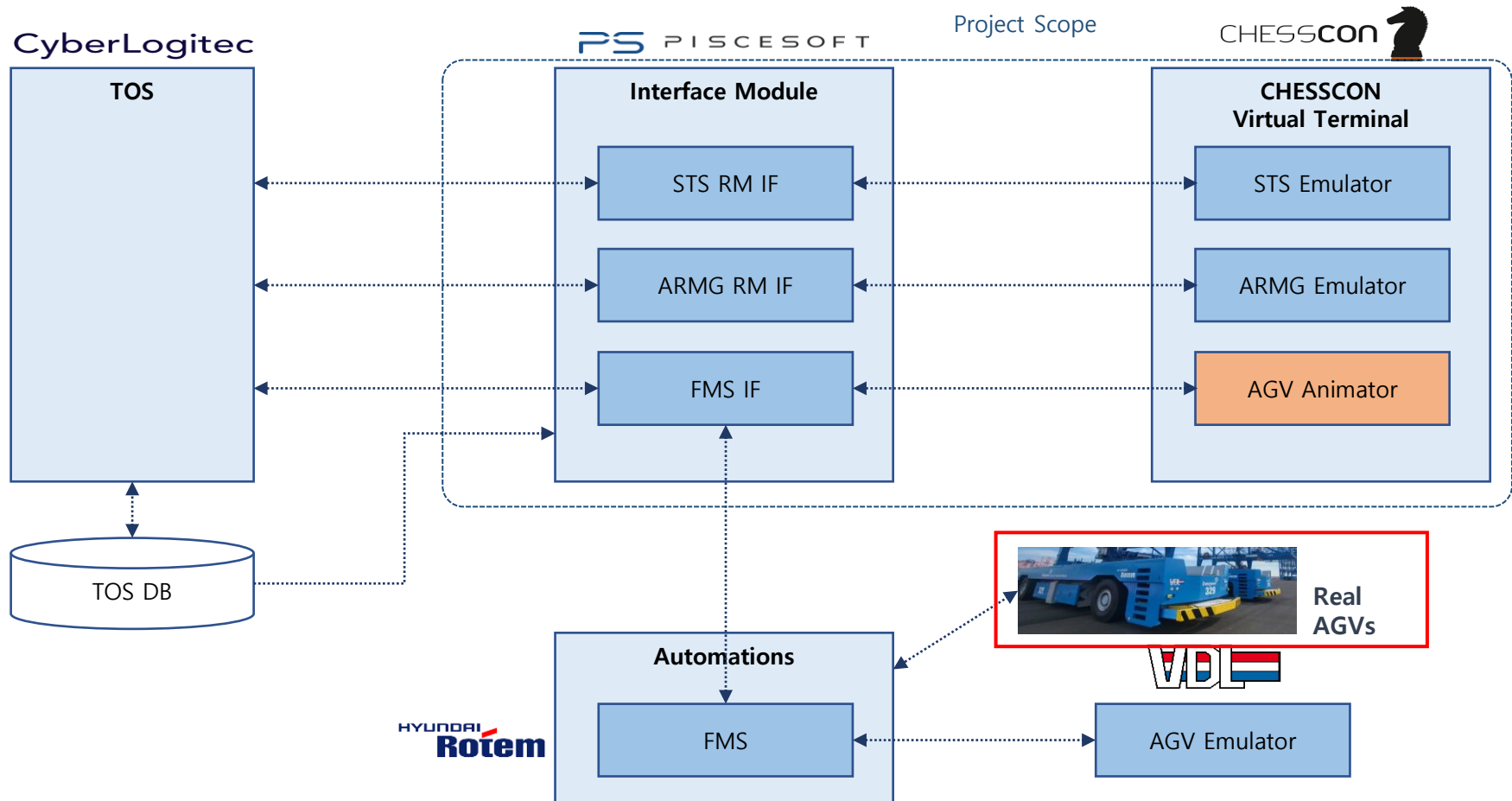
Equipment	Unit			Contents
	Total	2-5	2-6	
	STS X 20 (Container Crane)	12	8	• Ship To Shore crane • <u>Double Trolley Type</u> - Seaside : Semi-automated operation (Remote) - Landside : Fully-automated operation • Located 12 tier 24 rows • Manufacturer : Hyundai Samho H.I
	ARMGC X 86 (Yard Crane)	46	40	• Automated Rail Mounted Gantry Crane • Rahmen Type (72 units), Cantilever Type (14 units) • Located 6 tier 10 rows • Fully-automated operation • Manufacturer : HJ H.I, Doosan H.I
	AGV X 100 (Transport Equipment)	60	40	• Automated Guided Vehicle • 5 Units Per 1 STS Crane - Battery Type (8 hours of operation per charge) • Autonomous driving method using IoT and GPS • Manufacturer : VDL + Hyundai-Rotem



The idea of
hybrid testing

Configuration

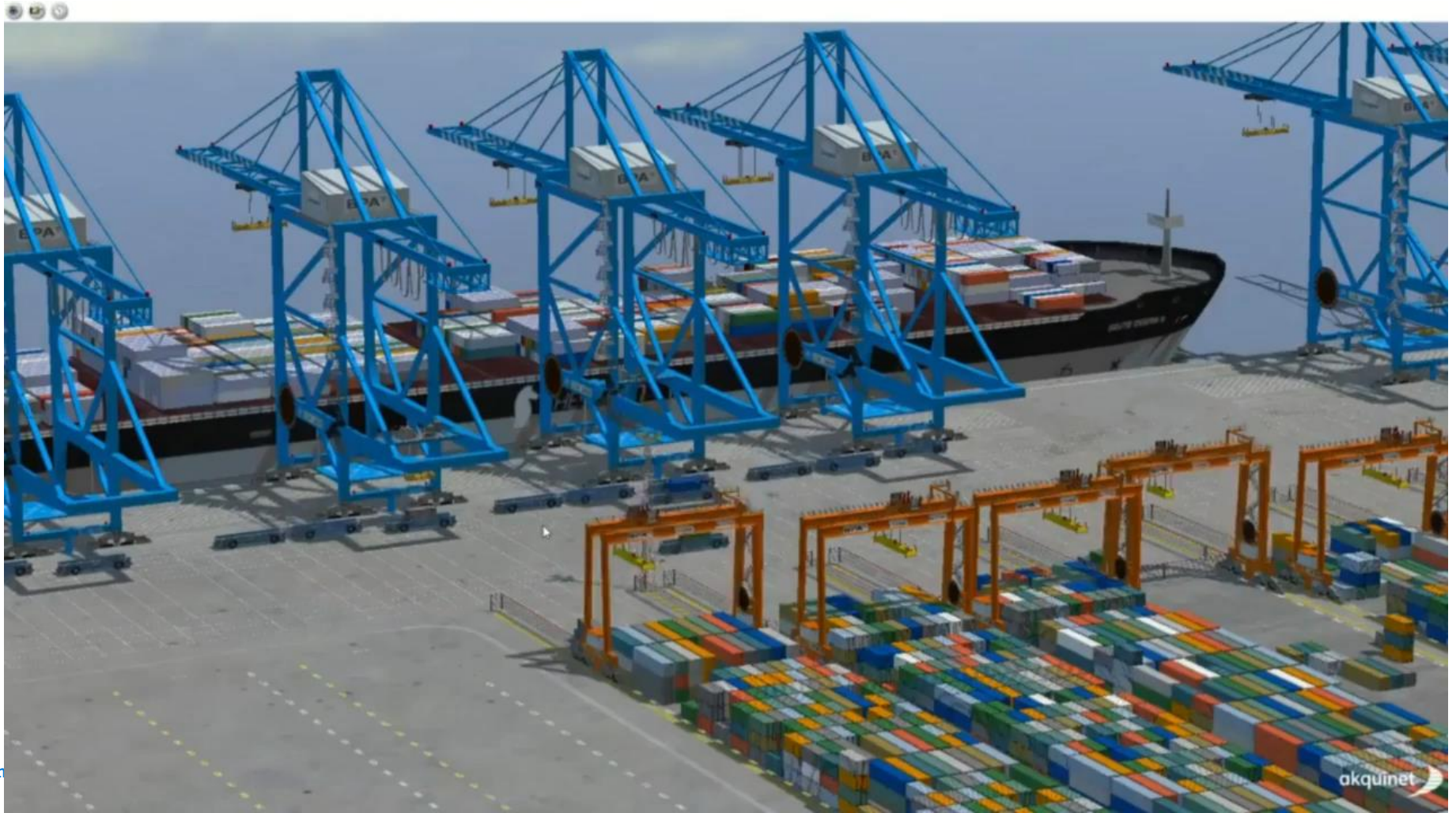
Simulation Environment



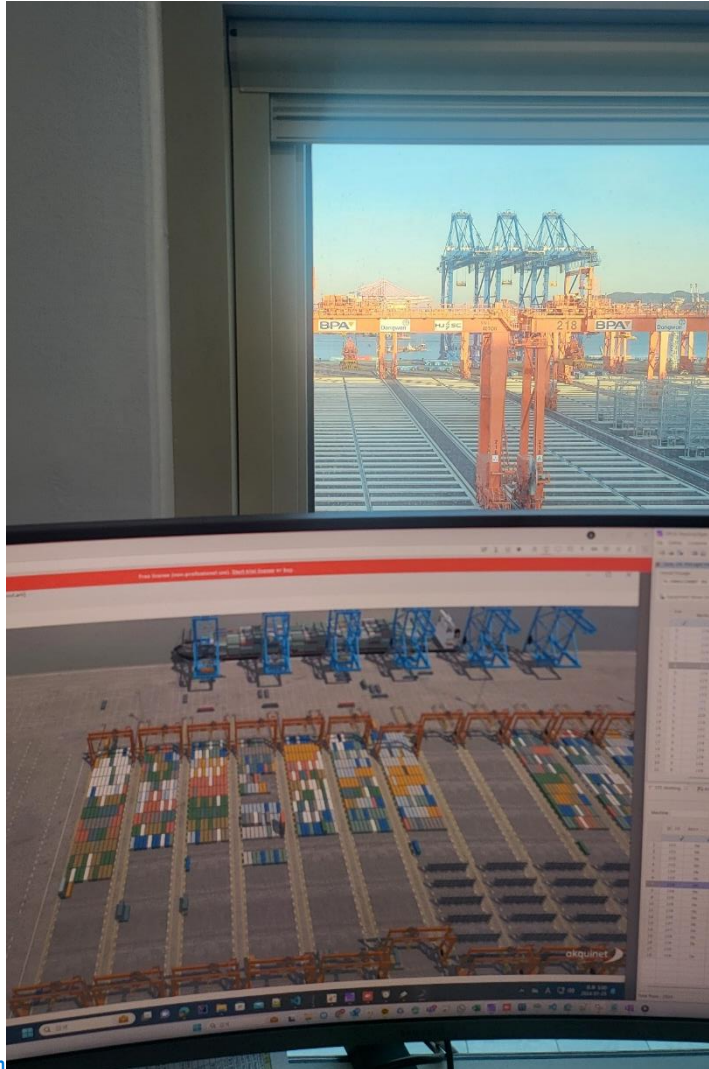
Emulation Testing in DGT

Hybrid Testing - Virtual Emulation and Real AGVs

<https://www.linkedin.com/feed/update/urn:li:activity:7169534386386796544/>



Emulation Testing in DGT



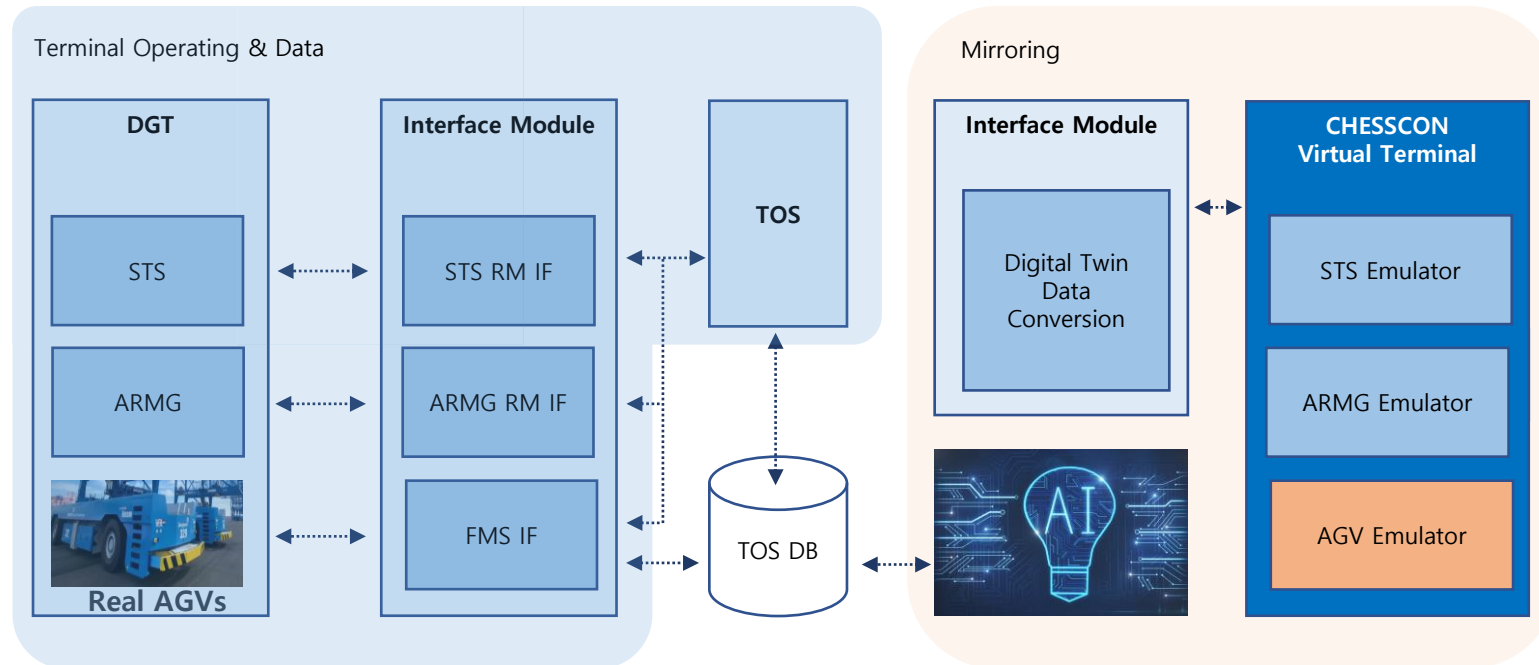
Jungwoo KIM DGT(Dongwon Global Terminal Busan) - Head of Management and Operation

DGT's innovative approach to integrating Digital Twin environment with real AGVs to streamline the validation process is truly commendable! It's inspiring to see how DGT(Dongwon Global terminal) tackles challenges head-on, setting new standards in efficiency and innovation within the industry.

4. Upcoming Plan

■ Validation of the Operating Environment with 'Digital Twin'

- Real-Time Data ↔ Mirroring Digital Twin Environment
 - Using the Emulator, *Establish the Same Digital Twin Environment as the Actual Operation of the DGT to Verify the Operation Environment of Phases 2-6 and the Feeder Port.*
 - By simultaneously conducting operations and research, we gather diverse data to achieve advanced *process optimization.*
 - *To maximize the utility of prediction and analysis tools by establishing a foundation for integrating and leveraging AI.*



Conclusions



- **Simulation technology** supports the planning of Greenfield terminals as well as the extension or reorganisation of brownfield terminals
- **Emulation technology** is state-of-the-art for testing (especially) automated terminals (combining real IT with emulated equipment)
- **Hybrid Testing:** Virtual Terminals may be combined with real pieces of equipment to guarantee a smooth go live (so done in Busan, April 5th 20224)

Conclusions





akquinet port consulting GmbH
Barkhausenstrasse 2
27568 Bremerhaven
Germany

Phone: +49 40 8 81 73-0
Fax: +49 40 8 81 73-111
info@akquinet.de
www.chesscon.com

Meet us at Booth K26

CHESSCON global references



ADANI, Sri Lanka
APM Terminals; global HQ & terminals
ASEAN Terminals, Philippines
BCT, South Korea
Bejaia Mediterranean Terminal, Algeria
BPA, Republic of Korea
Centerm Terminal, Vancouver, Canada
Contship, La Spezia, Italy
CSX, Jacksonville, USA
DGT, Busan Newport, Korea
DP World Terminal Antwerp, Europe
DP World, Australia
EUROGATE, Germany
HHLA, Hamburg , Germany
HPA Hamburg Port Authority, Germany
HIT, Hong Kong
JadeWeserPort, Germany
Cargotec / Kalmar Industries, Finland
CMSA ICTSI, Manzanillo, Mexico
MCT, Gioia Tauro, Italy
MTL, Hong Kong

Nhava Sheva Terminal, India
Noell Crane Systems, Germany
NTB, Bremerhaven, Germany
P&O Headquarter, London, Europe
Port of Tacoma, USA
PORTEK International Ltd., Singapore
Ports America, North America
PSA International, Singapore
PTP, Tanjung Pelepas Malaysia
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Sandwell Eng. Inc., Vancouver, Canada
SPIA ICTSI, Columbia
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Warsteiner Brewery, Germany

More than 100 projects in all 5 continents