

# Being proactive in avoiding bottlenecks in terminal operations

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APPLICATIONS GMbH



- Founded 2010 as ISL's commercial subsidiary
- Simulation and Emulation Tools for Container Terminals (CHESSCON)
- Complete studies and consulting on optimization of container terminal operation

- Research based consultancy institute in maritime logistics
- Suited in Bremerhaven and Bremen (Germany)







CEO Prof. Dr.- Ing. Holger Schütt

CTO Dipl.-Ing. Horst-Dieter Kassl



## Introduction



As a result of globalization international trade has greatly increased

 Caused by the aim to achieve more efficient operation and higher productivity nowadays automation of container terminals is progressing

 More and more terminals are searching for automated solutions to meet the challenge with larger vessels, bigger package size per visit and taller cranes



## Advantages of Automation

- Increase of container throughput
- Enhancement of terminal performance
- Decrease of labor costs
- Enhanced utilization of existing stacking areas
- Higher productivity and cost reduction per move
- STS, AGV, ASC and Shuttle Carriers are working hand in hand







#### **Hightech-Terminals**



## **Containerterminal Altenwerder (CTA) in Hamburg, Germany**

## (FACTS)

#### worldwide state-of-the-art and still base for all current terminals



#### **Dimensions**

- Terminal Area 1.000.000 qm, Quaylength 1400m
- Capacity 2,4 Mio. TEU (up to 3 Mio TEU)

#### **Ecological aspects**

- "Low Emission"-terminal
- powered by electricity derived from regenerative sources

[Source: https://www.hafen-hamburg.de]

#### **Equipment**

- 15 STS, 26 automated yard blocks
- 78 AGV + 10 AGV purely electric battery-powered

Start-up in 2002



### **Hightech-Terminals**

## Containerterminal Altenwerder (CTA) in Hamburg, Germany

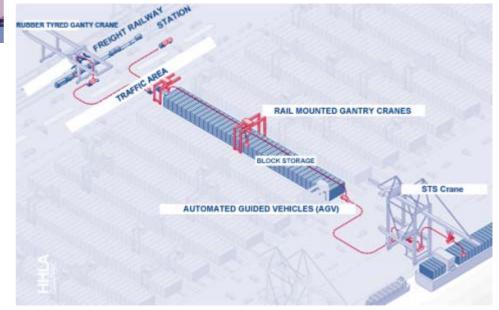


[Source: https://hhla.de/de/container/altenwerder-cta.html]

## 1. The basis of CTA's efficiency is the optimized interplay

- operation tested by simulation
- layout with a clear structure and short distances
- controlled by a continually upgraded IT system

#### 2. The way of a container







## Containerterminal Altenwerder (CTA) in Hamburg, Germany

#### **Container Handling**

- Semi-automatic STS cranes
- Automated Guided Vehicle (AGV)

#### **Container Yard**

 each stack is served by two different height rail-mounted gantry cranes (RMG)

#### **Fully automated**

AGV are navigated by 19.000 transponders set into the ground

signals are transmitted to a specially developed software



[Source: https://hhla.de/de]



[Source: http://wirtschaftszeit.at]





## How to deal with that knowledge?





not only a question of "either-or"

What is the solution if the terminal has to increase the performance but basically sufficient capital is lacking?

And how we can get into a proactive position, not only reacting after things happend wrong and inefficient operation is the order of the day?



## **Process automation & simulation based virtual terminals**



An intelligent optimization software can be implemented within a comparatively **short period of time** and at a **fraction of the cost** 

## **Benefits**

- Fully utilization of all functionalities of your TOS
- Intelligent algorithms can help to achieve a faster Return of Investment (ROI)



optimize investments/equipment



**reduce** number of equipment

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## **Process automation**



### **Possibilities:** Find individual solutions for smaller or existing terminals

#### **Known Data**

- Provide detailed information about the current state of the equipment and the jobs
  - Position Detection Systems (in- and external equipment)
  - Sensors for Collision Avoiding

#### **Replace Equipment**

• Automated stacking cranes (ASC) in combination with manually working equipment

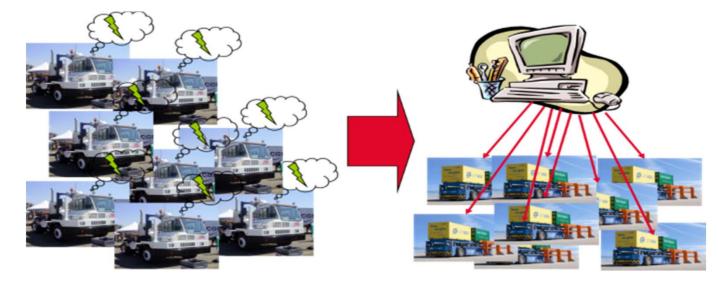
#### **Renew you strategies**

• Avoid waiting times and synchronize processes in a better way (normally within settings of the TOS)

## Automation leads to central control

## **Remote operations**

- from a control room
- means that the team comes together in one location
- easily interaction and sharing the same view







## **Process automation - Gate automation**





- Speeds up standard processes
- **Delivers information** about the current state
- Allows to build a digital copy of the status as base for process optimisation



[Source: http://dis-me.com, 2015]



## Terminal productivity is driven by...



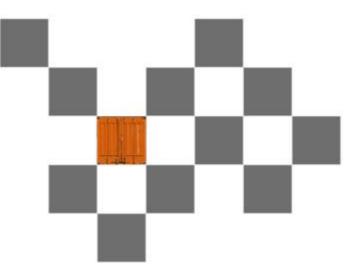


Korean Prototype of a shuttle carrier

more than ever very skilled control staff is required



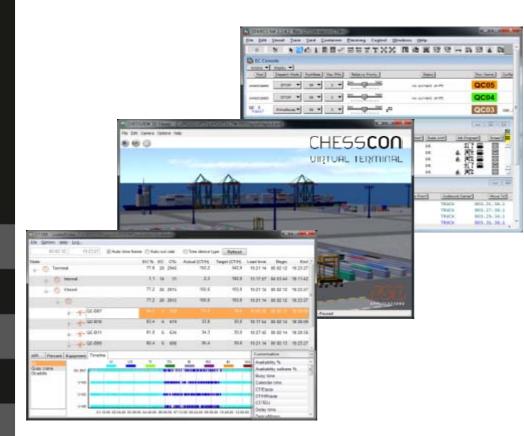
# ...but how to test and fine-tune this sophisticated systems?





#### **Simulation based virtual terminals**

#### Tune up your Terminal Operating System (TOS)





- Increase the skills of your control staff
- Provide new training methodologies
  - without burning fuel
  - without operational costs
  - without disturbing the real operation
- Find the best parameter setting within the TOS
- Find bottlenecks or overutilization
- Optimize utilization of devices
- Improve your terminal productivity
- Reduce operational costs



# CHESSCON

## A software tool to build a virtual copy of a real container terminal





## The main mission of Virtual Terminal

what you can do with Emulation



- use your Terminal Operation System (TOS)
- use your software interfaces
- but use a Virtual Container Terminal





## Finally: Being proactice in avoiding bottlenecks

## <u>ISI</u> APPLICATIONS

## Challanges

- Increasing vessel size
- Increasing peak loads at the quay
- Increasing peaks in the stack

## Solutions

- Adjust your equipment
- Process automation
- Equipment automation
- Sophisticated IT systems
- → Terminal Operators have to rethink their way of operation to stay competitive within a more and more demanding market!

