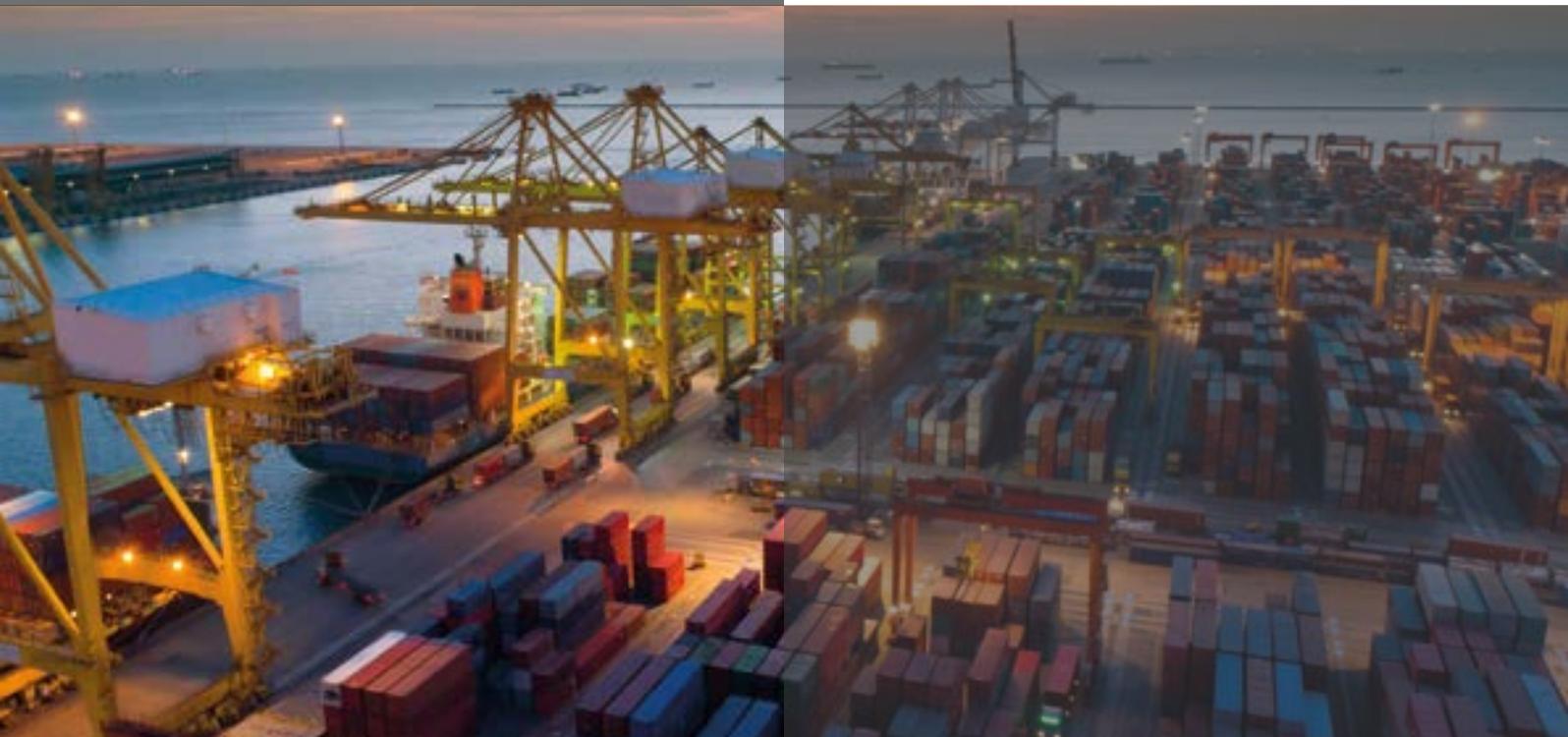


Total Soft Bank Ltd. - Busan Port Authority Simulation Project



COMPARING HORIZONTAL VS. PERPENDICULAR LAYOUT OPTIONS



Total Soft Bank Ltd. is a maritime logistics solution company which supported Busan Port Authority in several projects in the past. Due to a long-term partnership between Total Soft Bank and akquinet port consulting GmbH, Total Soft Bank gained a lot of experience in how to use the CHESSCON software successfully. Therefore, they decided to utilize the CHESSCON Simulation as well as the expertise of the AKQUINET PORT CONSULTING Team. This ensures the efficient/ up-to-date planning of a new container terminal with an approximate throughput of 4.000.000 TEU per year for the Busan Port Authority.



Project objectives

The objective of the project was to find the optimal layout by focusing on the stacking areas and evaluating the best pool size and utilization of the equipment required. Automated processes were the focus of Busan Port Authority's interest in order to remain competitive worldwide.

Simulation procedure

Total Soft Bank provided all data in close cooperation with Busan Port Authority. The AKQUINET PORT CONSULTING team built up the simulation models. Regular meetings between Total Soft Bank and AKQUINET PORT CONSULTING ensured that the planning status and the corresponding numbers were always up to date, as well as the results were always discussed in time.

This agile approach to the project led to a strict focus on the project target. Having the highest priority in the whole project, the best solutions for the container terminal operations had to be found.



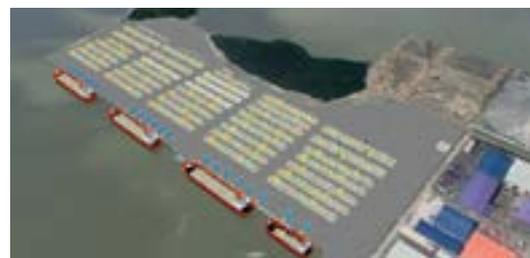
Busan Greenfield Terminal [Source: Google Earth, 04.03.2020]

Block arrangement

In the beginning, AKQUINET PORT CONSULTING has simulated two opportunities of block arrangements, one with horizontal and one with perpendicular stacks to the quay. Main decisive factor in this comparison was the quay crane productivity, as well as the utilization of the equipment working on the yard.

As CHESSCON Simulation always takes a full shift scenario into consideration, Total Soft Bank and AKQUINET PORT CONSULTING decided to simulate a peak shift with a maximum throughput as projected on the new Busan container terminal. This prevents potential bottlenecks in future operation not only in standard shifts with an average workload but also on maximum utilisation.

A smooth operation during the construction phase is a vital element of this success story. Hence, Busan Port Authority plans the construction fulfilment in three phases. For each of these phases, a simulation was done.



Horizontal
Layout in
CHESSCON 3D



Perpendicular
Layout in
CHESSCON 3D

Endurance test

In the one-week simulation AKQUINET PORT CONSULTING reproduced one week of shifts with the highest possible but realistic workload projected for this terminal. Besides container gate- and vessel handlings, the shifting containers and the housekeeping moves played the main role.

Planned equipment types to work on the Busan terminal

Regarding the perpendicular stacking yard areas, automated stacking cranes are planned as main stacking equipment and shuttle carriers ensure the container deployment to the rail mounted quay cranes with double trolley handling.

A special attribute on this future terminal is the deployment of four cantilever ASC's, which work side-loaded instead of the more common front-endloading ASC's. With CHESSCON Simulation, we tested if this alternative is effective to provide special services like e.g. "late arrival containers" for a vessel nearly finished in operation.



Results and Benefits

By means of this endurance test, based on **CHESSCON Simulation**, the AKQUINET PORT CONSULTING team was able to confirm that the terminal can handle the maximum throughput of ~4.000.000 TEU and is also able to handle all housekeeping and prestowing container moves in each weekly peak operations time.

Once a model of a container terminal is developed in CHESSCON Simulation, an easy integration of modifications or different test scenarios are possible at anytime by AKQUINET PORT CONSULTING or by the customers on their own. After the successful fulfilment of the project, Total Soft Bank a CHESSCON license to conduct modifications to the model on their own.

In future planning processes, Total Soft Bank is now well prepared to test expansions of the terminal area or to analyse if an increase in yearly throughput figures could be operated without any bottlenecks occurring.

ASC equipped stacks comparing to ASC cantilever

Cite Hoon Lee, Chief of Logistics System Institute, Total Soft Bank:

„It helped in the decision to decide equipment combinations and equipment specifications that could meet the expected operating productivity in the layout design stage.“

Cite Busan Port Authority:

„Total Soft Bank and AKQUINET PORT CONSULTING were not only providing the simulation technology and knowledge, but furthermore supported us with deep knowledge in port operation. In this way we jointly optimised the first ideas.“



For further information
please contact:



akquinet port consulting GmbH

Barkhausenstrasse 2
27568 Bremerhaven
Germany

Holger Schuett, Managing Director, Prof. Dr.-Ing.
holger.schuett@akquinet.de
+49 40 88 173 - 4387