QINGDAO TERMINAL:

FULLY AUTOMATED TO WELCOME MEGASHIPS

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This is the age of mega ships. These massive ships are carrying more cargo than ever before, and play a vital role in maritime transportation, dictating the future of the shipping industry. Just two years ago, the largest ship had a capacity of 19,200 TEUs. Today, the biggest containership, the OOCL Hong Kong, is just over 21,000 TEUs, and 25,000 TEU vessels are on the horizon. The race to deploy these behemoth ships is having a significant impact on container terminal operations, and causing many carriers to wonder if today's port facilities are sufficiently prepared to accommodate larger vessels and move more cargo, all while maintaining or improving operational performance.

To keep pace with the increasing amount of goods coming in and out of ports on mega ships, terminals must adapt their operations, ensuring that containers are unloaded and loaded seamlessly, with minimum time at port. Demands for greater efficiency have created a real challenge for terminals. To quickly process mega ships, terminals now require larger container gantry cranes, longer and deeper berths, increased crane productivity, in addition to more yard space, and better inland distribution to move containers in and out of the terminal faster than ever before.

Terminals around the world are challenged to find the most effective way to process this substantial increase in cargo while managing the cost. The response for many is full, or at least partial, terminal automation. Terminals of all sizes must learn to adjust, and those that fail to do so could find themselves abandoned by carriers as they search for better price and faster service in a market with many options.

While many terminals have dipped their toes into the automation waters – and others continue to sit on the sidelines – Qingdao New Qianwan Container Terminal (QQCTN) located in Qingdao, China, recently took the industry by storm, completing phase one of its three-phase automation project in a record-breaking 3.5 years. This move landed QQCTN with the title of Asia's first fully automated container terminal and made it a key port of call for mega ships around the world.

AUTOMATED FROM THE START

From design and planning through to execution, QQCTN constructed its first fully automated terminal and was up and running in record time – with R&D and construction tasks completed in about three years and a go-live date in May, 2017. This is significantly faster than the average 6-8 years it typically takes, and QQCTN's construction costs required just 75% of other similar international terminals.

Overall plans for QQCTN's automation project include a total of six berths on 2.088 metres of quay. The first phase of the project covered two berths on 660 metres of quay with seven remote controlled STS cranes, 38 Automated Stacking Cranes (ASC) and 38 Automated Guided Vehicles (AGV). The initial capacity is 1.5 million TEU with additional phases slated to automate the remaining berths and support a future capacity of 5.2 million TEU.

With a firm commitment to raising the bar for modern terminal operations, performance and efficiency, QQCTN knew that it must incorporate first-rate technology

to automate successfully. Under phase one of the project, QQCTN partnered with Navis and implemented the N4 terminal system, leveraging its advanced functionality for automated equipment, including optimized scheduling and dispatching, as well as analytics. Navis also supports dynamic interfaces to the Equipment Control System (ECS) and Qingdao's in-house Terminal Management System (TMS), interfacing with local applications such as billing and vessel scheduling.

Navis is a terminal system used by terminals looking to implement automation, regardless of where they are in their automation journey. In addition to its work with QQCTN, Navis has supported many other leading terminals in their transition including, LBCT, GCT Bayonne, Rotterdam and more.

In addition to the Navis terminal system, QQCTN has also set the industry standards by introducing new technologies such as AGV recharging during operations, eliminating the huge cost associated with building the battery exchange stations and time wasted when AGVs are not servicing operations. Lithium batteries are used instead of lead-acid batteries to reduce the weight (12 metric tons) and prolong the battery life. QQCTN has also invested in innovative equipment such as automatic twist lock handling machines, automatic fumigation and automatic waterside x-ray inspection.

The collaboration between QQCTN and leading technology and equipment providers in the industry helped the terminal achieve high levels of productivity from day one. With the proper software and equipment in place, QQCTN was well prepared when the first ship came to call, and is well ahead of many others in the industry in preparing for the influx of mega ships.

PROOF IN THE EXECUTION

QQCTN executed a very aggressive timeline for the build – beginning civil work in January, 2015 and awarding equipment and terminal system contracts at the end of June and August, 2015 respectively. The first installation of equipment was delivered in April, 2016 and by October, the first test vessel arrived. In March, 2017, the terminal handled the 260 metre long Ren Jian and loaded 892 containers in just under seven hours with an average of 25 crane moves per hour and vessel productivity of 129 moves per hour. While the call was considered a success, the real test would come during QQCTN's first vessel discharge/loading exchange.

In May of 2017, the terminal handled its first deep-sea vessel call with COSCO France, which brought 13,386 TEUs and executed nearly 4,000 container exchanges at QQCTN. The operation included seven STS cranes and achieved an average crane productivity of 26.1 moves per hour. The success of processing COSCO France through the terminal highlights QQCTN's viability as a first-class terminal for mega ships as it will have the capacity to berth the largest ships in the world – up to 24,000 TEUs.

As a fully automated terminal, QQCTN operates with a 70% reduction in staff compared to traditional manned terminals. It has also reported a 30% increase in efficiency and increased terminal safety as a result of its automated processes.

When looking towards the future, QQCTN expects to achieve an increase to more than 40 moves per hour with a utilized yard. By implementing Navis N4, QQCTN demonstrates that intelligent software integrated with advanced automated equipment enhances productivity.

THE WAY FORWARD IS CLEAR

While timing for the release of the next big wave of mega vessels remains unclear, we know that these ships will be carrying more cargo than ever and demanding that terminals provide them with the ability to move that cargo as quickly as possible. To answer the call of mega ships, automation will be the answer, and terminals like QQCTN are paving the way forward for the rest of the industry. QQCTN has shown that with advanced IT systems at the core of operations, it can achieve significant time and cost savings and deliver an experience that will keep ships coming back, no matter what their size.

ABOUT THE AUTHOR

Mark Welles, Vice President and General Manager, Asia, for Navis is based in Hong Kong. Mark is a 30-year veteran of the region and oversees Navis' business in APAC. Prior to that he led business development globally and was Navis' VP of Sales for Asia. Before moving to Navis, he was VP of Sales for TradeCard, leading business development in Japan and Asia for their cloud based financial supply chain solution. Mark has also held senior positions at Oracle, PeopleSoft and JDEdwards spearheading sales, planning and execution for their supply chain and manufacturing applications.

Yongcui Li joined Qingdao Port Group back in August 2001 and has since been focusing on digitalization of the container terminals. Over the years, she has worked on IT system development, testing, implementation, as well as optimization for mega container terminals. Yongcui became part of the core team when QQCTN was incorporated in October 2013. She has been involved in the layout design and planning for the fully automated container terminal, and the streamlining of the operational processes, with a focus in IT-systems-related planning and implementation.

ABOUT THE ORGANISATION

Navis understands that as operational processes become more complex, efficiency, collaboration and productivity are essential. As a trusted technology partner, Navis offered the tools and personnel necessary to meet the requirements of a new, and ever-evolving, global supply system. The Navis N4 terminal operation system is a platform that can integrate partner technologies, enabling terminals to optimise productivity.

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