Liverpool2: a historic port city revived

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300 years ago, Liverpool was at the forefront of international shipping and trade, with the creation of the world's first enclosed commercial wet dock. The city remained one of the world's leading ports well into the 20th century, but the advent of containerisation and new market conditions meant it was overtaken by some of its competitors.

Now, Peel Ports – port authority and operator of the Port of Liverpool – is gearing up for the opening of its new US$463m container terminal, Liverpool2. The development will make maximum use of technology and automation to more than double the port's TEU capacity on a site much smaller than the current terminal. Combined with Peel Ports' other logistical assets, including the Manchester Ship Canal and the national trimodal import centre at Port Salford, Liverpool2 will open up a new central gateway for UK trade.

Challenges

With ever-increasing vessel sizes we realised that unless we took action by 2015, 85% of the global container vessel fleet would not fit into the Port of Liverpool as the existing Royal Seaforth Terminal is accessed through a lock with a vessel capacity of 294 metres (length) x 32 metres (beam) x 11.6 metres (depth) and a channel dredge of 6.9 metres.

We therefore had to think beyond the traditional port boundary, identifying an intertidal site that could be reclaimed. This, however, would only facilitate a total terminal area of 17 hectares in phase one, much smaller than the existing terminal, and construction would have to support a 10 metre tidal range, one of the largest in the UK. We also understood that terminal productivity has a critical impact on supply chains and that port performance is a critical determinant in decision-making. So, our solution had to be able to meet the market requirements for service predictability, reliability and turnaround.

Our answer to these challenges has been the Liverpool2 terminal. This will provide Liverpool with an additional 1 million TEU capacity, help us to deal more effectively with the 26,000 annual vessel movements through the port, and deliver 'best in class' capabilities to our customers.

Management approach

For us, it has been fundamental to ensure that we are taking the right management approach. Although the physical infrastructure is essential, its performance is dependent on two other aspects of port operation: the effectiveness of the systems and processes in place, as well as the quality and training of the people managing them.

Accordingly, there are a number of priorities that have influenced our decision-making throughout and continue to guide how we deliver our services. The first is information. As far as possible, we look to improve both the quality of information that we manage and how this is shared with our customers and clients. Accurate forecasting, real-time exchange and building datasets can make a major difference to the efficiency of operations. The second is automation – something that the container terminal industry has been slow to adopt, despite the technologies being advanced, proven and capable of delivering reliable operational efficiency. The third is customer service and being 'more than ports'. We aren't just looking to differentiate ourselves on cost and efficiency. The ambition is to provide an experience that really adds value to shipping lines and our ultimate customers – the cargo owners – by offering a wider range of services supporting the whole supply chain.

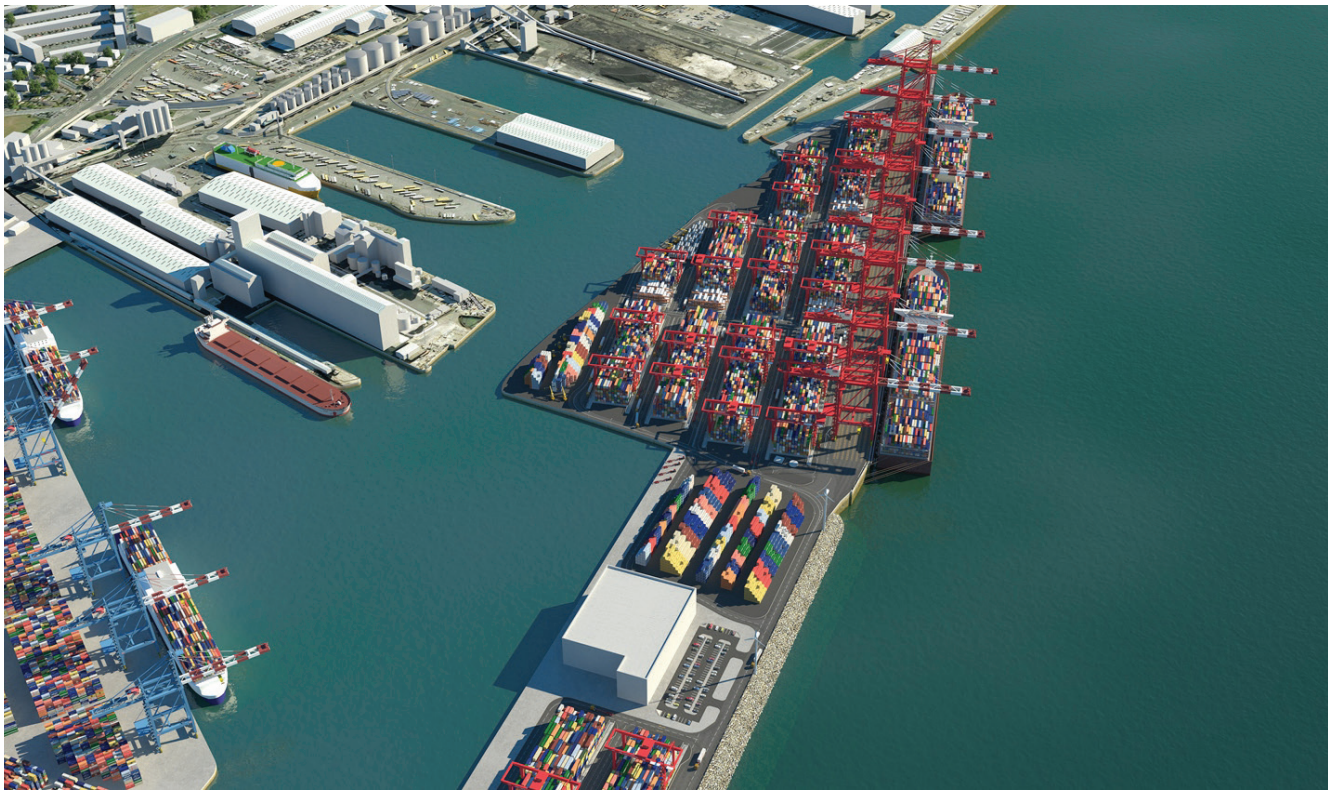
The port and shipping sectors are often considered to be traditional, hierarchical and conservative industries. We have taken steps to streamline our structure and challenge – indeed remove – some of the 'old port' mindset. We have also worked to create a more flexible workforce that can respond to changes in demand and not just respond to customer needs but to anticipate them.

The single most important action to support this has been training with a strong focus on in-job training. Where we have skills gaps, we recruit new talent, and we have implemented people development plans across the full spectrum of our intake, from apprentices to post-graduates. It will only be with the right people, culture and behaviours – managing our physical and technological assets – that we will realise the full potential of our operation.

Construction programme

For the majority of this project so far, the progress that has been made has remained hidden underwater, as we have worked to reclaim land from the sea. 296 steel piles have been driven into the seabed, allowing the infilling of 1.43 million tonnes of sand and silts taken from the Mersey estuary and deposited behind the new quay wall, up to a level of 6 metres above ordinary datum.

The piling process, which began in 2014, involved drilling from large jack-up rigs and inserting tubular piles to create a new 854 metre long quay wall. The area behind the wall has also been dredged to bed rock to allow for virgin materials to be deposited. The infilling process began in February this year with the arrival in the river Mersey of the 'Willem van Orange'



trailer suction hopper dredger. The vessel, operated by Dutch specialist Van Oord, has a handling capacity of 10,000m3 (21,000 tonnes) and took materials from a site 20 miles away from Liverpool2, with each dredging and discharge operation taking 6.5 hours from beginning to end.

The final stages of this first phase of construction has seen the installation of capping beams, with bollards and fender blocks, the installation and commissioning of five new ship-to-shore cranes, as well as other infrastructure works required for the terminal opening.

Equipment selection

Planning

Ultimately, the primary issue was to provide a predictable, repeatable, reliable and stable operation that would meet the needs of our current and future customers. The terminal needed to provide additional capacity of around 1 million TEU on a compact site, achieving over 1,500 container moves in a tidal window, allowing STS crane operations of up to 30 moves per hour in winds of up to 88kmph, and maintain existing landside service level agreements. We carried out extensive modelling over a prolonged period during the planning and design phase to ensure that we arrived at the optimum solution for our particular site.

Operating systems

A further set of considerations related to the range of interlinked IT systems required to ensure the efficient operation of the built infrastructure. We took the decision to invest in the Navis N4 terminal operation system, using Liverpool2 to drive change across the whole business, with the TOS planned to be introduced at all our container terminals enabling us to standardise our group operations. To ensure a smooth transition from SPARCS 3.7, and other in-house systems, we are rolling out N4 one terminal at a time over the next 3-4 years, beginning with the existing terminal at the Port of Liverpool and Liverpool2 itself.

Autogates

Another major element of our investment in information systems has been the introduction of Autogates to deliver faster turnaround times through a streamlined process from landside or quayside entry to exit. The fully automated system, supplied and installed by Kalmar and its partners, APS Technology Group, uses state-of-the-art identification technologies to manage gate operations, ensuring that all containers and trucks are automatically identified before entering or exiting the terminal.

Advanced OCR (optical character recognition) and line-scan camera technology (automatically detecting seal presence) link with gate operating software that seamlessly integrates to Navis N4 and our Customer Access Portal (CAP). The security process is further completed using biometric fingerprint identification to further validate driver/load identification and enhance security.

Haulier transactions are now fully integrated into the N4 system, which means more secure and efficient visits and minimal turnaround times at our terminals. This process also means that paperwork and leaving the vehicle are unnecessary, thereby increasing security, improving safety, reducing risks and saving time spent completing manual checks.

Cranes

Not surprisingly, the most visible aspect of the new terminal is the eight STS megamax cranes being supplied by ZPMC. There are an initial five quay cranes and 12 cantilever rail-mounted gantry cranes (CRMGs) for phase one, with a further 3 STS cranes and 10 CMRGs in phase two.

The new container handling equipment will be capable of handling two 380 metre vessels simultaneously, and ultimately will have a capacity of over one million TEU. The STS cranes' specification includes twin-pick, 10 high on deck air draft and outreach of 24, with safe working loads up to 85 tonnes (on hook).

The CRMGs will be single pick with a 50 tonne lift capability, and have a 13 wide container span and be able to lift 1 over 6. With semi-automated remote-controlled operation, the cranes will reduce the time taken to transfer containers from port to road or rail. They will also have the ability to operate at speeds in excess of 30mph and wind speeds of up to 88kmph.

In anticipation of their arrival we have introduced a $772,000 state-of-the-art 'virtual' training simulator on site, designed to ensure all operators are ready to manoeuvre the giant structures from day one of installation. Working closely with ABB, we have produced a customised, high-tech training simulator tailored to interactively test the abilities and skills of drivers by presenting them with realistic, operating scenarios.

The future

Our strategy has been to go as far as we can along 'the curve' of modern port operations. Liverpool2 has given us an exceptional opportunity to introduce leading-edge technology and infrastructure that will remain fit for our customers' needs for decades to come. That is not to suggest we are sitting on our laurels though. We see the scope for improvement in the continued seamless integration of our back-office operations and the overall refinement of our processes going forward.

More importantly, our vision as a company is to be very much a supply chain partner, offering port-centric logistics solutions, such as the new warehousing and distribution facility at Port Salford, that will provide a better end-to-end solution for the cargo owners that need an efficient route to the heart of the UK marketplace.

About the author

Based in Liverpool, David Huck heads up the largest operating ports cluster in the Peel Ports Group, which includes its operations in Dublin, Heysham, Liverpool and Manchester. The cluster ports collectively handle over 17,000 vessel movements and 48 million tonnes of diverse cargo per year. David has a career background including tier one manufacturing logistics and port operations management. He holds a BSc (Hons) in Industrial Engineering and an MBA in Industrial Management.

About the organisation

Peel Ports is the UK's second largest port group, owning and operating six of the UK and Ireland's most important ports. It is headquartered in Liverpool and employs around 2,750 staff. The ports handle around 70 million tonnes of cargo every year with over 35 shipping line services from 26 shipping lines calling through its network every week. It is part of the Peel Group, one of the UK's leading infrastructure, real estate and investment companies, with a portfolio ranging from airports to energy, including flagship sites such MediaCityUK, Manchester's Trafford Centre and Pinewood Studios.

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