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To build or not to build – that is again the question

By Dr TERRY O'BRIEN AM, Executive Director, OMC International

In 2010, BHP began a lengthy and expensive investigation related to the possible construction of an Outer Harbour at Port Hedland to increase its iron ore export capacity by 100 million tonnes per annum, to meet its future need. The estimated cost of the first phase of the project when it was abandoned in 2015 was \$20 billion. At that time, the capacity of the Inner Harbour was capped at 495 million tonnes per annum.

Since 2015, OMC's Dynamic Port Capacity Model (DPCM®) for Port Hedland has shown that major channel improvements by Pilbara Port Authority (PPA), together with growth in the vessel fleet sizes and a number of other enhancements, have allowed the Inner Harbour cap to be increased to its current level of 617 million tonnes per annum.

With all miners exporting from Port Hedland currently seeking additional capacity, the question again arises as to whether to provide this by asking the miners to build an outer harbour, or can their increased demands be met by further expansion of the Inner Harbour capacity?

This important question was raised in a recent report in the Australian Financial Review entitled 'Iron ore miners dig in for battle over precious port space' (22 November 2020). In this article, writer Brad Thompson reported that 'Iron ore miners BHP, Fortescue Metals Group, Hancock Prospecting and Mineral Resources are preparing to make their competing cases for precious space at Port Hedland after rejecting the West Australian government's urging to build a \$10 billion outer harbour.'

The growth of iron ore exports from Port Hedland since OMC's first DUKC® system was installed in late 1995, has been truly astounding by any standards. At that time, port throughput was 50 million tonnes per annum. December 2020 marks the 25th anniversary of DUKC® at Port Hedland and annual throughput is currently 538 million tonnes per annum, more than a tenfold increase in a quarter of a century! In 1995 there was one miner (BHP) and usually one ship departing on a tide; on 27 December 2017, when the record single tide throughput of 1,589,061 tonnes was 2020 achieved, DUKC® made available an additional 1.0 metre in draft on average, for each of the eight vessels in the departing convoy, thereby facilitating an extra \$7.6 million worth of throughput on a single tide, equating to just under \$1 million per vessel.

The importance of the resources exports to the Australian economy, and DUKC®'s contribution to this vital activity, was recognised earlier this year by the Federal Minister for Resources, Water and Northern Development in the following statement:

"It's great to see innovative Australian technology delivering world class safety and huge economic value for our resources sector. Resource and energy exports are vital to Australia's economy and it's essential to ensure safety of shipping whilst optimising throughput. DUKC® is facilitating ports to achieve this," Hon Keith Pitt MP, Minister for Resources, Water and Northern Australia, April 2020.

The impact of the COVID-19 pandemic on the Australian economy in the months following the Minister's statement would certainly have been very much greater than it has been without the cushioning effect of the continuing rise in our iron ore exports from the Pilbara. It is clear from the present four-way tussle for additional port capacity at Port Hedland that the mining companies involved are still very much concerned with planning for additional growth, which brings us back to the question of what is the ultimate limit on the capacity of the Inner Harbour?

Over the 25 years since its inception at Port Hedland, DUKC® has evolved technologically, and in 2017 OMC moved to a strategic partnership with PPA to better align the capabilities of OMC with the goals of PPA, providing a full range of services including DUKC®, DPCM®, Chart Overlays, DUKC® Optimiser, CROP, dredge optimisation and other value adding technologies.

The DPCM® is a discrete event simulation model of the port of Port Hedland operations that incorporates OMC's Dynamic Under Keel Clearance (DUKC®) system. The purpose of the DPCM® is to provide a tool to forecast the impact on port capacity of changes to variables, such as ship loader rates, vessel fleet profiles, cyclones, channel depth improvements and asset availability (tugs, pilots, etc.). The performance of the DPCM® has been validated each year since its development against actual port throughput.

Analyses undertaken utilising the DPCM® has been the basis by which the declared port capacity at Port Hedland was increased by PPA in 2015 from 495 million tonnes per annum to 577 million tonnes per annum, and to its current limit of 617 million tonnes per annum, deferring the date at which any Outer Harbour development is needed. This increase is more than the additional capacity of the \$20 billion first phase of the shelved Outer Harbour project, obtained at a fraction of the cost of that project.

"The additional capacity was the result of ongoing investment in world-leading port innovations and technology and provides port users more opportunities to maximise the amount of product they ship through Port Hedland," Hon Alannah MacTiernan MLC, Minister for Ports, September 2019.

Clearly, it is most efficient economically to 'sweat the assets' of the Inner Harbour to achieve its maximum safe capacity. Further incremental gains in capacity are achievable but they are getting increasingly harder to realise and substantiate. This can be done by analysing the safety and capacity implications of changing operating variables, such as increased vessel size, reduced vessel separation times, increased numbers of tugs and pilots, and increased efficiencies in ship loading operations. All of these variables can be fed into the DPCM® model to help provide the optimal answer to the 'build or not to build' multi-billion dollar question.

Increasing throughput and enhancing safety are not the only benefits of the DUKC® suite. It is estimated that by optimising the sailing draft of each iron ore vessel from the Pilbara, the annual reduction in fuel costs for the shippers equates to US\$130 million. Furthermore, the associated reduction in CO2 emissions is approximately 1.2 million tonnes. As the shipping industry moves towards reducing emissions, optimisation of technology such as DUKC® is already playing a significant role.

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