Smooth sailing

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An Australian designed and developed draft enhancing system known as Dynamic Under Keel Clearance (DUKC) is increasing cargo capacity and saving port authorities, shipping companies, importers and exporters millions of dollars.

The (DUKC) system is a unique maritime engineering software system developed for safer and more efficient navigation of large ships in shallow restricted waterways.

Developed by Melbourne-based OMC International, the technology was initially installed in the port at Hay Point in Queensland in 1993 before it was introduced to Western Australia in 1994. Here, it was initially used for BP tankers at the Port of Fremantle and the following year, it was introduced to Port Hedland and the Port of Dampier in the northwest of the state.

OMC International managing director Peter O'Brien said the key to the system was the way it calculated waves, tides, currents and vessel dynamics for both planning purposes and in real time situations to produce the safest and most efficient transit of ships in and out of ports and along coastal waterways.

"Traditionally when ships load there is an allowance for a nominated clearance under the keel that's enough for the ships transit out of the channel to be made safely under all conditions," O'Brien told Australian Mining.

"The idea behind the dynamic system is to incorporate the conditions of the day in real time. These conditions include environmental factors, as well as wave and tide measurements. The OMC developed system then allows maximum cargo loading while ensuring that all safety and keel clearance margins are maintained.

O'Brien said the system was a superior alternative to the traditional static Under Keel Clearance (UKC) regime which is really a nominal compromise between safety and economics.

"By adapting to the conditions for individual passages, a dynamic UKC system will outperform a static regime economically on most occasions. Moreover, it simultaneously outperforms a static regime in terms of safety by identifying the touch bottom risk in any proposed passage at the time of the passage.

"Our systems have been shown to provide a level of risk which can be orders of magnitude lower than previously existing static rules," O'Brien said.

Among the biggest beneficiaries in Australia of the technology are those associated with iron ore and coal exports.

The use of more and larger vessels at Port Hedland for example, has increased the port's export capacity by about 15 million tonnes of iron ore per annum, with further increases expected in the next few years.

The Port Hedland Port Authority has committed to spend considerable funds over the next five years on enhancements to the DUKC technology. The port has seven iron ore berths at

present and will have 10 by 2009 when Fortescue Metals Group's new export facilities are planned to become fully operational.

Under recent agreements between the Port Hedland Port Authority and OMC, the existing DUKC system has been augmented with DUKC Portable Pilot Units (PPU) so pilots can monitor the calculations of ship transits in real time.

"The DUKC PPU provides a seamless transition from the shore based prediction system, which operates from 36 hours up until a vessels transit, to a system operated onboard a vessel during transit through port approach channels and shallow waterways," O'Brien said.

"The ship-based PPU is operated by the pilots during an actual transit. The PPU enables a pilot to monitor dynamic UKC predictions throughout the transit. It has speed control functionality to ensure that the pilot's speed and vessel passing intention is always consistent with safe UKC."

The (DUKC) Vessel Traffic Service (VTS) is the most recent development from OMC International and provides in-transit monitoring of a vessel's predicted UKC to a VTS Operator.

Data from the vessels Automatic Identification System (AIS) and a PPU (where used) feed directly into the VTS to provide VTS Operators with warnings of the imminent possibility of vessel groundings during their transit through depth restricted waterways.

O'Brien says the cost savings to bulk ports such as Port Hedland, the Port of Dampier, and the Port of Hay Point in Queensland have amounted to hundreds of millions of dollars since installation of DUKC systems.

Savings

BHP Billiton first commissioned DUKC technology at Port Hedland in 1996. The port exports more than 110 million tonnes iron ore annually. The system gives an extra 60 to 70 cm of draft opportunity on most tides, extra sailing windows of 30 to 60 minutes on spring tides and three to four hours on neap tides. Since the introduction of the (DUKC) system in port Hedland, there has been an increase in port capacity of 9 million wet metric tonnes [BHP Billiton, Our Quality Story, 2008].

Pilbara Iron (now Rio Tinto) commissioned DUKC technology at the Port of Dampier in 1995. The port exports more than 110 million tonnes of iron ore annually, and had an average increase in maximum draft due to the application of the DUKC of 40cm. Significant widening of tidal windows, particularly during neap tides has resulted in increased value of annual export earnings of more than $130 million.

The Ports Corporation Queensland commissioned DUKC technology at the Port of Hay Point in 1993. The port exports more than 85 million tonnes of coal annually. Typical increases in draft due to the application of the DUKC system range from 50cm to 1.1 m, depending on the tidal residuals and wave conditions. This has resulted in an additional 3 million tonnes of coal annually (an average increase of over 8,000 tonnes per vessel). The freight savings from these increased shipments amount to more than $60 million annually. The increased value of annual export earnings amount to more than $180 million.

Peter O'Brien
Managing Director