



# Evolution or revolution?

*With landside operations becoming increasingly congested and land for expansion limited one solution is for terminal operators to move their operations to the water. Peter van Schie reports.*

**M**oving terminal operations to the water might seem a silly idea but there are a lot of benefits to be gained. A case in point was the 'battle' that was raging in the port of Rotterdam, the Netherlands around 18 years ago, where two terminal operators – one was operating land-side bulk handling equipment while the other was operating floating grab cranes – were vying for the business of the same clients. This battle also affected the Port as it saw no income from the floating crane operator as the ships were not mooring at a berth but were unloaded mid-stream – something that was (at that point) unusual for the Port of Rotterdam. Over the years, terminal operators have been looking at ways to reducing congestion, pollution, lowering (operational) costs, enhancing efficiency and productivity

by moving their operations 'somewhere else'. For the container industry this has resulted in two plans that might see container operations take to the water (see Jan/Feb 2006 issue – Floating an Idea article). The first plan included one single container crane placed on a barge in support of another land-side based container crane. The two cranes would 'sandwich' a container vessel and work from both sides to load and unload containers. Such a concept is similar to the Amsterdam Container Terminals (previously known as the Ceres Container Terminal) in Amsterdam, the Netherlands, where 6 land-side based container cranes (3 on each side) tackle the loading and unloading of containers on a vessel that has been 'parked' in a slip. This futuristic concept was designed by Oakland-based Liftech and the company has come up with the second suggestion - a Floaterm concept (see Jan/Feb 2008 issue on Crane design) that utilises waterside container cranes on a barge to form, in effect, an offshore wharf. The container ship is moored to the crane barge or vice versa and containers are

transferred from the ship to the barge deck or to feeder barges. But both concepts might not be economically viable (specially at the moment with a bleak economical outlook) and there is also the issue of stabilising the barges during operations, for example if the barge is moving too much, the spreader would be swaying making it difficult for the driver 'to land' the containers properly or even pick them up.

## Bulk industry

The floating crane story is completely different for the bulk market. Movement of the barge shouldn't be an issue for the grab (there is no particular place where the grab needs to land) and the floating concept provides an excellent alternative to land-side bulk cargo handling equipment for operators with high throughput of cargoes. It is therefore no surprise that for the last couple of years many mobile harbour crane manufacturers have entered this market, with some coming up with innovative ideas. Two of the largest mobile harbour crane (MHC) manufacturers, Germany-based Gottwald Port

Technology and Austrian-based Liebherr Werk Nenzing, have seen an increase in the purchase of their 4-rope MHCs (in particular in India) and have diversified their know-how and applied technology to cater for floating cranes. But they do have competition from other manufacturers.

## Gottwald Port Technology

Gottwald Port Technology first introduced their floating crane concept in 2004 on the Mississippi River based on their Mobile Harbour Crane technology. Five years later and the sales figures have jumped to a total of 15. As with other manufacturers their design is based on proven technology, short delivery lead times, high classification and service life and all kinds of applications including open-sea operation. So why opt for a Gottwald floating crane? Peter Klein, Marketing Manager at Gottwald Port Technology points to "our success in this market field." Until today all Gottwald floating cranes are operated in heavy-duty bulk handling either for coal and other bulk material import or export. "Floating cranes are currently experiencing a renaissance. They have short delivery lead-times, especially as they are based on the modular Mobile Harbour Cranes, make additional quay space unnecessary and neatly navigate around the entire problem of approvals procedures. And, in view of the long-term increases in the volumes of cargoes being shipped, they are a highly attractive way of supplementing land-based handling machines," adds Robert Wassmer at Gottwald. In 2008, the company received 3 new orders including one from Associated Terminals (AT) in Louisiana, USA, for bulk handling between ocean-going vessels and river barges on the Mississippi (AT commissioned its first Gottwald floating crane in 2006.) Another order for use on the Mississippi River came from Archer Daniels Midland Company (ADM) for its wholly-owned



subsidiary American River Transportation Company (ARTCO). It was only in 2007 that ADM ordered two floating cranes for ARTCO. Furthermore, at the beginning of 2008, ARTCO formed a stevedoring joint venture with St James Stevedoring Co LLC (SJS), with whom Gottwald developed the first floating crane in 2004 and which company operates three Gottwald floating cranes. PT Indo Straits in Indonesia, a new customer for Gottwald, also ordered one floating crane for the trans-shipment of coal from river barges to ocean-going vessels, with handling rates of up to 1,500 tonnes per hour. This crane has been granted Lloyd's Register Certification for significant wave heights of 2.5m as it will be working 4km off the Indonesian coast.

## Liebherr Werk Nenzing

Liebherr is working closely together with Italian-based Logmarin, a joint venture company with Rina Group, Charles Taylor Consulting and the Bancherocosta Group, and marine engineering company Interprogetti. Logmarin knows the market well as it has also been involved in several consultations and project feasibility studies related to the supply chain for commodities such as alumina, coal, iron ore, liquefied natural gas, steel products, etc. in Australia, Brazil, Finland, India, Indonesia, Italy, Romania, Russia, Suriname, the USA and the Arabian Gulf. The start of their co-operation resulted in an innovative floating crane concept where the pontoon includes storage for bulk cargo and acts like a buffer (see Grabbing Attention article – Jan/Feb 2007 issue). But it didn't stop there; drawings became reality and orders started to come in. PT Mitra Swirectm, an Indonesian joint venture between PT Mitra Bahtera Segarasejati and Swire CTM Bulk Logistics, placed an order for their multi-purpose handling concept and named it the *Princesse Abby*. In November 2008, she completed her first trans-shipment operation at the Muara Pantai in the Sulawesi Sea (East Kalimantan). With the completion of the crane commissioning and on-going crew training a daily average throughput of 23,000 tonnes was achieved, which reflects an outstanding performance and throughput for a floating crane operating in the open sea. The hull structure of the *Princesse Abby* is a longitudinal duly reinforced frame with spoon bow, inclined stern and two skegs aft. Bilge keels are fitted on each side to the extent of about 3/4 length of the pontoon and structural anti-rolling fins are fitted in way of the stern skegs. Movement dumping devices and suitable dynamic factors to bear stress and fatigue connected with the continued heavy



duty work in open seas, have been developed and incorporated in the design in order to maximise the equipment availability for the ultimate benefit of the end user. The crane used is a dedicated heavy-duty high performance four-rope grab crane type, designed and manufactured by Liebherr, and has a lifting capacity of 35 tonnes in grab operation at an outreach of 35m. The bulk cargo collection and crane cycle time is further enhanced by using a Peiner 24.3m<sup>3</sup> four-rope scissor grab - the large spread of the grab lips (they are nearly horizontal when opened) and the shorter closing stroke contribute to maximum productivity of the floating crane. What is different with this floating terminal compared to others is that it provides a 3000 tonnes of buffer storage in the hold. By providing storage space during idle time – when vessels are not available or still manoeuvring - the company believes it has a head-start compared to their competitors. Another benefit is that the overall costs compared to those for standard floating cranes is between 15% and 28% lower than that of cranes with comparable performance.

## E-Cranes

Another company that has recently sold a floating crane is E-Crane Worldwide, Belgium. The company develops turnkey material handling solutions and is probably better known for their Equilibrium or balance cranes (see Testing Times article – December 2008 issue). Their cranes differ from the standard MHCs as their design is based on an ingenious parallelogram style boom that provides a direct mechanical connection between the counter-weight and the load. This unique system ensures that the crane remains in near perfect balance throughout



its working range. Compared to conventional cranes that require as much as 80% of their available energy just to move the boom, stick, and grab, the E-Crane makes gravity work reducing horsepower requirements and power consumption by up to 50% and significantly reducing maintenance and operating costs. Their fundamental design principal of balance, results in much lower dynamic overturning moments transferred to the floating terminal compared to competing equipment. This benefit results in less barge movement, more precise control of the load, simpler mooring systems and less potential for damage to adjacent vessels or infrastructure. It is therefore no surprise that their concept of a floating bulk handling terminal is well suited for both port operations (ship-to-shore), as well as midstream transfer (barge-to-ship and ship-to-barge) and 10 years ago E-Crane delivered its first barge and ship mounted E-Crane to offload barges and small ships. The company adapted this concept for the offloading of ships up to Panamax-class and has more than 15 units operating successfully world-wide. They also offer models with up to 50 tonnes duty cycle capacity due to their movable counterweight and fixed parallelogram linkage. In the second half of 2008, the company delivered a mid-stream transfer station for Seaboard Corporation, USA, for their Midema (Minoterie De Matadi) flour mill in Matadi, Democratic Republic of Congo. The floating trans-loading station, the 1000m<sup>2</sup> barge *Mama Mobokoli* was equipped with a 1500B-Series E-Crane, designed and built in Belgium, and reached the grain terminal in Matadi after a 40-day ocean going voyage. The floating terminal is designed for 'ship-to-quay' discharging of handy and handy-max vessels (25,000 to 30,000 tonnes) with 'ship-to-ship' and 'midstream trans-loading' capabilities of break bulk commodities on the Congo River. The crane has a reach of 35.9m, lift capacity of 13.5 tonnes

and a 400 tonnes/hour unloading capacity for handy-class vessels. To unload the ships, the floating terminal is towed alongside and secured to the ship, then using its winches to move along the ships. The crane transfers grain from the ship into two hoppers, a conveyor then transports the grain directly to the silos. E-Crane has also been involved with PowerSouth for their coal handling terminal to offload coal from incoming barges at their Charles R Lowman Power Station in Leroy, Alabama. The centre-piece of their coal handling system is an all-electric E-Crane. It has the ability to offload 1,500 tonnes of coal per hour with only 450 kilowatts of installed power. The crane has been assembled, is on-site and will be operational this month.

### NKM Noell Special Cranes

One of the companies that has its 'roots' established in the floating crane market is NKM Noell Special Cranes from Hoofddorp, the Netherlands. The company entered the floating crane market about 3 years ago with the introduction of the Lemniscate principle with all modern technology available including frequency drives. Although NKM is a new face in the market, the company employs a large number of engineers and designers from the 'old' company Figee. About a decade ago, Figee was the market leader in the field of floating cranes before it went in to liquidation and today its cranes are still in use with numerous satisfied customers around the globe. After a lull in investing in floating equipment for a number of years the investments in floating cranes has picked up again and it is therefore no surprise that NKM is following in the footsteps of Figee and has been approaching its old clients for floating cranes. One of these clients is bulk terminal operator Ovet with terminals in Terneuzen and Flushing in the south part of the Netherlands. "Ovet has always worked with 25 tonnes floating cranes and wanted to increase

its performance and capacity per crane," said Mike Besyn, Sales Manager at NKM Noell Special Cranes. "It was looking at a 40 tonnes grab capacity crane but it had to fit in the existing logistical concept of Ovet and therefore the pontoon could not be wider than 21m." NKM came up with a combination of capacity and pontoon width and offered the Lemniscate type which suited Ovet perfectly. This entry in the market was quickly followed with a second crane order from IGMA of Amsterdam for unloading agri-bulk, minerals and biomass. Rietlanden, part of EDF Trading, also ordered a new floating Lemniscate crane for their operations in Amsterdam with delivery early 2010. "This order is particularly important as we have proven that the more conventional types of cranes do not perform with the same speed and unloading rate as the Lemniscate cranes due to the balance of crane configuration on pontoons and hence longer lifetimes and lower writing off periods," Besyn adds. Another client in Amsterdam, OBA, has also awarded NKM Noell a complete upgrade of their 50 tonnes floating crane Nijlpaard. "The above orders and the interest from the markets shows that the floating concept in congested ports has never been away and the logistic concept still plays a very important role in today's bulk loading/unloading," Besyn added.



### Conclusion

The manufacturers we spoke to were in agreement that the use of floating terminals for bulk cargo handling will increase over the next couple of years as more and more terminal operators become aware of the benefits of the floating crane. Its independence of quay facilities and mooring places could solve a lot of congestion issues in ports and harbours around the world. The variety of options and the possibility to tailor-make the design is a plus for many potential clients as the crane can be tuned to meet specific requirements including being self-propelled, fit with sheltered area for steel products, heavy lift, larger storage capacity etc. Finally, there is scope for similar floating terminals for container handling operations but this seems to be 'just a dream' – for the moment. ■