

# Floating berth or the capability to express innovation and to remain competitive in today market

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With the ongoing growth in sea-borne trade, utilisation of larger vessels and demand for quick port turnaround, marine terminals are facing significant challenges to cope. Most of the traditional ports still have to rely on old, last generation shipment systems and drafts restriction, thus preventing the industry benefiting from the use of the modern fleet of vessels.

Many existing ports are trying to improve existing approach channels and berthing facilities sufficiently to enable them to handle larger vessels. However, costs for this are not always justifiable economically.

Floating terminals should be taken into more serious consideration as viable alternatives.

There are many cases in coal, iron ore, copper and agro-bulk markets where commodities move solely thanks to the introduction of the floating terminals.

Unlike for other standard vessels' cranes, the type of facility to be installed on the floating berth would become a key component of the end user's logistics supply chain.

This brings about a fundamental difference in the designing and selection of cargo handling facilities, which have to be designed specifically for 'heavy-duty operation, in open sea'.

Deep and long lasting marine background is also a vital designing milestone for reliable and smooth operation, consequently.

We know of examples where big mistakes have been made in design and equipment selection. In some cases, the lack of reliability of the envisaged cargo handling facility was not perceived due to an excessive focus on price, or poor assessment of a newly introduced technology which then proved unreliable.

While a decrease in accidents and an improvement in the reliability of floating facilities has been experienced in the off-shore industry (oil and gas), since the introduction of specific Class, State regulations and the Oil Companies International Marine Forum (OCIMF) guidelines and recommendations, we feel that for dry bulk commodities there is still a 'home-made approach', hence room and scope for improvement.

Appropriate Class requirements, guidelines and recommendations should be applied, to give and maintain the safety and reliability standards required in the dry-bulk trans-shipment sector as well.

## Study and guidelines

To fill in the gap, RINA, the Italian Classification Society (IACS member), and Logmarin are currently developing a comprehensive study aimed at setting up new guidelines for the new generation of 'open water' dry bulk terminals to be built.

This initiative benefits from the combined pooling of Logmarin's shipping logistics marine knowledge and operational background, and Liebherr's technological skills, together with the experience and know-how of RINA.

For the purpose of the guidelines for the design of a floating berth, data such as:

- The sea state (height and periods for both wind generated waves



The Floating Crane Ibu Francesca will be deployed, as of July, in East Kalimantan, where it will tranship coal on behalf of PT Berau.

and swell) the floating units are expected to face (either while in operation or idle due to bad weather) during the life time

- The scope and type of services
- The number of cycles per year etc. is to be taken into account

The buoyant body of the floating facility is free to move on its axis. The rolling, the pitching and the yaw movements are the movements which affect floating crane equipment and mooring appliances at sea the most.

It has been estimated that the floating unit can move over 10,000 times a day, thus causing fatigue to the mechanical components, mooring lines, disruption of operation, breakdowns, and last but not least, discomfort to the crew (especially crane drivers).

The mechanical components of the cargo handling facility, i.e., the crane's/shiploader's slewing bearings, gearbox, jib pinions, hoisting winches, etc., are subject to the sea behaviour of the pontoon, accordingly.

Movement dumping devices and suitable dynamic factors which bear such stress and fatigue, should be developed and incorporated in the design of the cargo handling facility, thus maximising the equipment availability for the ultimate benefit of the end user.

## Scale of reference-values

There isn't a standard criterion for whether an operative threshold under which the Off-shore operation can be carried out. This depends on many factors, floating terminal size, dynamic load on crane stability, design, type of waves etc.

Today there are no fixed rules/technical references to certify the quality of floating crane performance in open waters, or a database on which floating cranes should consequently be designed to comply with.

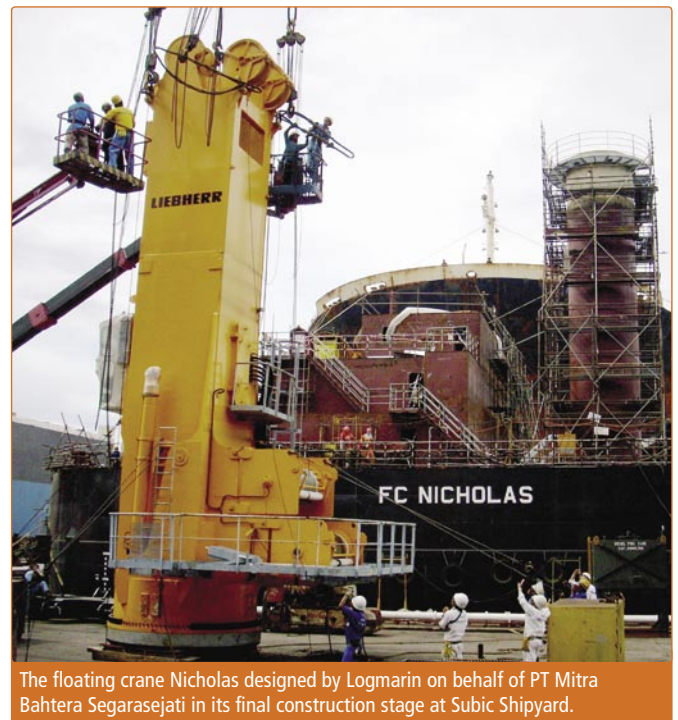
We propose to register the superior performance of this new floating crane concept, to use the collected information to construct, for the first time ever, a scale of reference-values for floating crane performance to be sponsored and recognised internationally.

The engineering work incorporates and benefits from the outcome of model tank tests which have been carried out to validate a mathematical sea-keeping model. These have been developed to identify the effect that the various dimensional parameters of both the pontoon and the crane would have on the behaviour of the floating crane while operating in different weather conditions.

The floating crane's behaviour at sea will be measured by inclinometers and accelerometers, and all the data will be recorded by a data logger. This data will then be used to define the forces and loads the crane is subjected to while at sea, since forces and acceleration are related through Newton's laws of motion and Einstein's equivalence principle.

The recorded data, (three axes acceleration and amplitude measurement for the different sea conditions encountered by each specific floating crane) will be then analysed by Logmarin to allow a final tuning and validation of the above mentioned experimental mathematical sea keeping model, enabling the identification of the effects of the variations of the design parameters on the floating crane operational ability for different sea conditions.

The above device will be utilised in order to reasonably improve the design criteria of both the crane and the pontoon, and then sort out the weather thresholds under which the floating



The floating crane Nicholas designed by Logmarin on behalf of PT Mitra Bahtera Segarasejati in its final construction stage at Subic Shipyard.

crane can safely operate within the new crane limit design criteria in the intended operative location.

The above software could be used to estimate the operational weather working day based on the prevailing weather conditions at a specific site. I could also duly assess the downtime caused by bad weather which might, consequently, affect the project economics.

## Research outcomes

Logmarin has decided to allocate resources in the above research, not only in order to reduce floating terminal downtime caused by bad weather, but also to extend the lifetime of equipment mechanical components, thus resulting in an increase of floating berth availability, along with lower maintenance and repair cost/downtime. In short, the goal is to obtain the best compromise price versus sea keeping capability/equipment availability.

Prospective clients who are considering a trans-loading operation should seriously consider engaging a consulting engineering firm with actual experience in this specific off-shore field, in order to determine the most favourable system to suit their specific needs, both technical and commercial, and for overseeing the project implementation from the beginning through to the commissioning. This is of paramount importance.

Logmarin and its associated marine engineering company Interprogetti have, along with Liebherr, jointly developed an innovative floating crane for handling multipurpose cargo in the open sea.

The Logmarin floating crane has been conceived after many years of experience in designing and operating floating cranes and trans-shipper vessels.

The first such unit (classed by RINA) dubbed 'FC Ibu Francesca', after Mrs Francesca Hadinata of PT Mitra Indonesia, (for her entrepreneurial capacity and foresight of giving Logmarin the ability to translate this new floating crane concept into reality) will start to operate coal transshipment operation on behalf of Berau, in East Kalimantan by July of this year. The Logmarin floating crane has been designed for both harbour and open water operations, and is equipped with combined 'Rolling Damping



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Systems' for pontoon rolling and pitching motion attenuation, thus rendering them less sensitive to weather conditions as compared with standard floating cranes.

The cranes are designed by Liebherr for heavy-duty-open-sea operation to ensure high turnover and efficient and effortless loading/unloading to and from vessels up to Capesize.

### ABOUT THE AUTHOR AND COMPANY



**Captain Mario Terenzio** is a shipping and logistics professional with 12 years seagoing experience in oceanographic, container and Ro-Ro vessels. He has had his Marine Master Licence since 1987. Capt Terenzio joined CoeClerici in 1992 as Coal Terminal Manager and as of 1994 was in-charge of business development activities, focussing on providing customised floating terminals and self unloading vessels. He developed the new generation of floating terminals, introducing innovative ideas in the raw materials handling off-shore.

In March of 2006 he joined a newly established consultancy company, 'LogMarIn advisors srl' a joint venture, based in Genoa, among first class and internationally renowned firms in their related field of expertise, namely Rina Group, Charles Taylor Consulting, Banchemo – Costa group. LogMarIn advisors srl, concentrates the capability and the different expertise,

professional skills and experience of the partners to provide comprehensive consulting and advisory service. This service aims at evaluating water transportation systems, identify loading, ocean/coastal and river transportation and cargo handling bottle-necks, make recommendations and identify cost benefits.

**Logmarin** is a company jointly owned by the RINA Group, the Banchemo – Costa Group and the CTC Group. Logmarin sums up the experience and know-how of its parent companies in the field of logistics. Logmarin specialisation is in the offshore side of the logistic chain with a main focus on innovative handling systems for worldwide offshore loading and unloading operations of ships up to capesize type. Logmarin provides comprehensive integrated consulting and advisory services covering the entire supply chain as well as each of its individual segment: from supply of raw material up to the end user production site.

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