PLANNING AND MANAGING THE FIRST SHIPLIFT PROJECT IN INDIA

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INTRODUCTION

The Project Seabird Site is at Karwar, on the western seaboard of India. Karwar is a small district town and secondary port in the State of Karnataka. The Site is located about 110 kms south of Goa and it can be reached by road and rail from Goa, Mumbai and Mangalore. The district is relatively undeveloped and has few industries or infrastructure. However, the Site provided a splendid opportunity for the Navy to develop a large Naval Base on a green field site and to introduce concepts that were modern and state-of-the-art.

The Naval Harbour is dredged generally to a depth of 12 metres below Chart Datum and protected by the construction of North and South berm type rock breakwaters. A short spur breakwater provides additional protection during severe wave conditions. The harbour will provide all weather tranquil berthing conditions for naval ships and craft. The design and construction of the breakwaters takes advantage of the headlands and offshore islands. The harbour thus created will have a main port channel and an emergency entry and exit channel. Also, the harbour will be sufficiently spacious to accommodate all the home ported Indian Navy (IN) vessels as well as warships on goodwill missions and for naval exercises. The Master Plan prepared by REDECON Australia – a fully owned subsidiary of Sinclair Knight Merz – in association with NEDECO of Netherlands, is a highly integrated development plan based on refined concepts used by Australia and western navies and it provides sufficient scope for expansion for the foreseeable future. When fully developed, the Seabird Naval Base will be one of the most modern large naval facilities in the world. It will certainly be the state-of-the-art naval base in India.

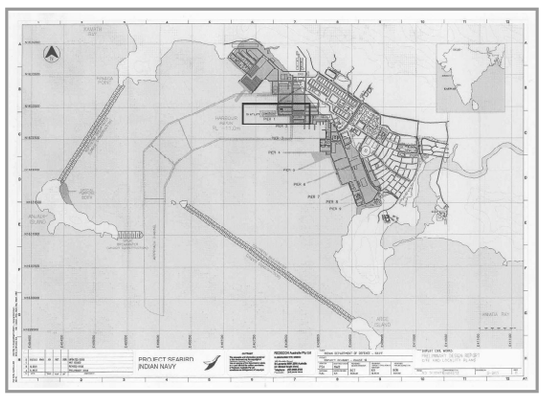

Figure 1: Site location and master plan

Due to its shear size, complexity and implications on the national budget, etc., the Seabird Project had to be constructed and commissioned in phases. Phase 1 is only the beginning of this implementation of the Master Plan. Phase 1 is critical in the sense that it will set the standards and pattern for future developments. Of the items included in Phase 1, the Shiplift Facility is considered to be one of the most important components. It will firmly establish the Naval Base and become the focus of future developments for Project Seabird.

Site location and the Master Plan is shown in Figure 1.

SHIPLIFT CONCEPT

During the Master Plan preparation in 1989/90, alternative dry docking concepts were investigated, including dry docks, floating docks and large slipways. In instances where two or more ships require simultaneous dry-docking, a shiplift and dry berths complex can usually be justified. As the number of dry berths increases, a shiplift becomes more and more attractive, even when only the capital costs are taken into consideration. There are very significant additional benefits and cost efficiencies associated with the shiplift facility based on operational considerations, such as speed of lifting and dry berthing, working at the same level as the yard level, free flow of material and labour on a level yard. Once the shiplift is installed, the dockyard's requirements and the available land may be the only limitations for addition of any number of dry berths. Further, a shiplift facility makes use of the waterfront more efficiently than other multiple dry docking concepts like dry docks, floating docks, slipways, etc.

The Master Plan included a shiplift for destroyers and medium size support ships. The proposed size of the shiplift was well justified and has withstood the years passed since the Master Plan was prepared in 1989/90.

SHIPLIFT DESCRIPTION

In simple terms, a shiplift is a large elevator platform, which can be lowered into water, have a ship hauled-in and positioned over the cradle/blocks preset on the platform and then lifted vertically to the yard level, so that the ship can be moved from the platform on to a dry repair berth on land.

A shiplift consists of a steel lifting platform, suspended by wire ropes attached to hoist drums, raised and lowered vertically by a series of hoists. The hoists are distributed in equal numbers on either side of the platform and are located on piers or foundations. The hoists are driven in a synchronised mode. By synchronising all the hoists, the platform with or without a ship is raised or lowered vertically, uniformly and in a horizontal plane. Finer levelling adjustment is built into the system.

The shiplift is controlled and operated from a control system and operator console. The control system has a number of in-built safety mechanisms in order to prevent incidents that may arise due to overloading or underloading conditions or severe imbalance of the platform due to shipload and a variety of other causes.

The Ship Transfer System is of modular design and construction so that it can be reconfigured to suit varying lengths and beam of Indian Navy ships. The modular system greatly enhances the flexibility and versatility of the Seabird Shiplift Facility. In the current program, two sets of these modular cradles are included for dry docking 2 ships; additional sets can be added for each new berth, as and when constructed. The ships and cradles are transported by a self-driven hydraulic bogy system, both longitudinally and transversely. Only one set of hydraulic bogies is required for the ship movement and transfer operations in the yard. The bogies need not be immersed in seawater. By interconnecting and grouping the hydraulic bogies, the heavier sections of keel loads can be redistributed more evenly and thus heavier ships lifted.

Figure 2: Typical Hoist

The Shiplift and Ship Transfer System is designed for a long service life of 50 years and it will be capable to dock most Indian Navy ships. Also, it will be quite suitable for dry docking coastal and medium size cargo vessels.

LOCALISATION

Maximum localisation and transfer of know-how to Indian firms was a major consideration in award of the Contract. The added benefits are the assured supply of spares to Seabird Shiplift and opportunities for manufacturers to supply similarly to other shiplifts.

CONTRACT DETAILS

FIDIC Conditions of Contract for Plant and Design-Build was used. The Shiplift Contract was awarded in March 2002. Commissioning was completed in mid 2006.

TTS from Norway supplied the Ship Transfer System, under a sub-contract to the main contractor.

The Contractual details and main roles are summarised as follows:

Client – Indian Navy, Ministry of Defence
Engineer – REDECON Australia Pty. Ltd. – a fully owned subsidiary of Sinclair Knight Merz
Lloyds – Register (LR) Third Party Certifying and Classification agency
Contractor: Syncrolift, Inc. Responsible for all Contract works

The Contract gave flexibility and freedom to the Contractor to select and award sub-contracts as he considered appropriate for supply and manufacture in India and abroad, with proviso that maximum localisation would be achieved. At tender stage, Syncrolift, Inc. indicated that about 2/3 localisation could be achieved.

It is pleasing to note that more than 70 percent Indian content was actually achieved.

DESIGN REQUIREMENTS

The Seabird Shiplift has the following characteristics:

- Overall length of the shiplift platform - 175 m
- Overall width of the shiplift platform - 28 m
- Total available vertical travel - 20 m
- Speed of vertical travel or lift (constant speed) - 0.26 m per minute

- Hoists: 430 tonne capacity - 42 Nos.
- Spacing of hoists (centres) - 8.5 m
- Articulated steel platform structure with timber decking - 2400 tonnes
- Maximum Distributed Load (MDL) on the platform - 85 tonnes per metre

The Ship Transfer System has the following characteristics:

- Modular Cradles with Keel and Bilge blocks: 2 Sets x 34 Nos.
- Spacing of Modular Cradles: 4.25 m centres along the ship's keel
- Self driven hydraulic bogies: 68 Nos. x 177 tonne lift capacity each
- Modular Cradles can be lowered and moved individually to enable full access to ship's hull during each docking
- All drive and lift systems are hydraulic
- Hydraulic Power Pack: Diesel driven 2 Nos. Hydraulic Power Units mounted on single chassis along with hydraulic tank, hose reels, valves, operator consol, climate controlled cabin for 3 personnel, etc
- Power pack is operated by PLC system.

SUPPLY DETAILS

Main local items supplied, manufactured, fabricated, and installed include the following:

- Shiplift Platform: fabricated on Site.
- Shiplift Hoists: castings, machining, assembly, load test, etc.
- Gear boxes
- Machine Control Centre (MCC) units
- Ship Handling System
- Ship Transfer Cradles and Hydraulic Bogies

The Contractor elected to import the following items:

- Electrical motors
- Wire ropes
- PLC System (a Syncrolift, Inc. proprietary item)
- Power pack for Ship Transfer System

A typical hoist is shown in Figure 2.

SHIPLIFT PLATFORM

The Shiplift Platform was fabricated and painted on site. The finished components were transported to the End Transfer Bay for final assembly and installation by a gantry crane as shown in Figure 3. The platform was made of 20 modules, each module consisting of an infill panel welded to the main transverse beam. The platform was erected prior to installation of hoists and reeving (or attaching) of wire ropes. Due to severe monsoon condition, the Contractor was required to erect a large shed and control the environment for grit blasting and painting.

Figure 3: Platform erection gantry

Figure 4: Illustrates the shiplift nearing completion

COMMISSIONING

During manufacture and assembly, critical components were load tested and certified by LR. This was carried out on components as follows:

- Electrical motors and brakes
- Gear boxes
- Hoists (fully assembled)
- Hydraulic bogies
- Cradles

After installation the Shiplift and Transfer System were tested further as follows:

- Load testing for 85 T/m MDL
- Ship Trials in order to prove the entire system and to train Indian Navy Personnel.

LESSON LEARNT

During the course of this project, a number of issues came up and tested all parties involved. Some lessons learnt may be summarised as follows:

- Contractor's Project Manager to have full technical and commercial responsibility and to be permanently on site.
- Contractor to closely co-ordinate/manage sub-contractors and take a pro-active/flexible approach.
- Engineer to fully define quality of materials and requirements, with nothing left up to the Contractor's "normal standards".
- Engineer to have fully experienced team on site, with full continuity through planning/design/construction stages and take pro-active/flexible approach.
- Engineer to consider pros/cons of separating shiplift contract from ship transfer system contract in future projects.

CONCLUSION

Large, complex and technically difficult maritime projects, involving a shiplift and transfer system, can be successfully completed to world standards in remote areas of developing countries. This requires innovative planning and open-minded management. It is essential to be proactive and flexible. Continuity of staffing using skilled and experienced personnel is a decisive factor for success, combined with good relations between all parties.