

## SB Marine, India

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## MARINE AND OFFSHORE STRUCTURE CONSULTANT

S.B. Marine offices are located in India, Singapore and Netherlands with Naval Architects, Structural Engineers and Piping Engineers. With short span of time SB Marine has earned high reputation in Maritime and Offshore Oil & Gas Industry as technologically sound and reliable consulting company with sample projects as below.







Concept Design of Modular Platform



Analysis of Deck Crane



Complete Design of Jack-up Barge



**Motion Analysis** 



Mooring Analysis at Platform site



Pipe Stress Analysis of FPSO



**Drill Ship Analysis** 







of FPSO Transportation Analysis Sample Jobs

#### <u>Services:</u>

• Concept design, initial design, basic drawings and Production drawing preparation for ships, barges, tugs, lift boat etc.

- Project management and supervision services.
- Conversion and / or up-gradation engineering.
- Vessel load out and transportation analysis.
- Ballasting sequence during load-out and stability analysis during voyage.
- Sea-fastening design and drawing preparation.
- Structural check of barge deck, sea-fastening members, grillage design and tow analysis.
- Vessel motion analysis Wave diffraction, motion response and spectral analysis
- Mooring and Berthing Analysis
- •.Global and longitudinal strength analysis
- Lifting and Jacket upending analysis
- Pipe Laying Analysis by Off-pipe
- •Salvage Response Analysis, Pipe Stress Analysis
- Deputation of Designers For Manual As Built
- Sketching of Offshore pipelines & structures,

#### Recent Job Reference:

- 72m Oil Tanker Complete Design & Drawings
- · 24m Sea going Crew Boat with SPS code
- Lift Boat for sea bed soil investigation
- Design of Elevated Platform for crane barge. Seafastening and Grillage design etc.
- Conversion of 105m cable lay vessel to offshore support vessel. Design of 2375 CuM Split barge
- Concept Design of Modular Drilling Platform Topside
- Jacket launching and upending analysis
- · Mooring and Tow analysis for 60m Pipe-lay barge
- Motion analysis of catamaran for response prediction
- Structural Analysis for 225 Ton Crane on 50m barge
- Jack-up In-place analysis, Inclining test, stability analysis, seating drawings of equipment
- 32" & 40" Dia Sub-sea pipe laying Transportation and Installation Engineering
- Installation of SB marine developed on-board loading software on Jack-up rig
- Marine Operating Manual preparation for Jack-up Rig **Software Capability:** SACS, ANSYS, StabCad, Hecsalv, Zenmoor, Neptune, Caesar II, Cadworks Tribon, Off-pipe, OptiMoor, Moses





Offshore Lifting feasibility Study

Concept Design Of Floating Hotel

## Sample Jobs Cont...



**In-place Analysis of Jack-up Rig** 



## MRPL Calm Buoy Si Tie In spool Lifting procedure





il Production Platform

# addd Eig. 2: Analytical Model 3D view with legend of shell thickness (cm)



Moon Pool Structural Design Analysis



Design of 2375 CuM Split Hopper Barge



Design of Oil Tanker



Design of Seagoing Deck Barges

Design of Various SPS Crew Boats





admin

Logie

lion III:



**Design of Floating Pleasure Boat** 



Conversion Engineering from Ro-Ro Ferry to 535 person Passenger Ship



Transportation & Installation Engineering for Sub-sea Pipe Laying Job



Complete Design of SPS Class Crew Boat



Complete Design of 330 Ft Flat Top Barge

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## ENGINEERING SERVICES FOR

# **OFFSHORE PLATFORM**



### **SB MARINE STAFF IN BPA PLATFORM**

## **OTHER SERVICES:**

- 1. PDMS / PDS DRAWINGS.
- 2. PREPARATION PIPING P&ID, ISOMETRIC, PIPING GA
- 3. HELIDECK DESIGN AND MODIFICATIONS
- 4. SUPPORT ENGINEERING LIKE LIFTING ANALYSIS, MOORING ANALYSIS, RISER ANALYSIS ETC.
- 5. STRUCTURAL ANALYSIS
- 6. PEOPLE ON DEPUTATION





ONSITE ENGINEERING SERVICES: WORKSCOPE FOR CONTRACTORS: REVAMPING, REPLACEMENT, REFURBISHMENT AND MODIFICATION

- 1. AS BUILT SKETCHING
- 2. LASER SCANNING
- 3. SUPPORT FOR DETAIL ENGINEERING FOR FABRICATION
- 4. SURVEY AND AS FITTED STRUCTURAL DRAWINGS
- 5. AS FITTED PIPING ISOMETRIC DRAWING
- 6. INPUT DATA COLLECTION FOR PLATFORM ENGINEERING, DECK EXTENSION, MODIFICATION, LIFTING
- 7. **REMOTE SERVICES**





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#### OFFSHORE OUTFALL PIPELAYING PROJECT AT TUNA-KANDLA, GUJARAT

#### 25 MLD TREATED EFFLUENT FACTORY DISPOSAL OUTFALL OF 560 MM DIA HDPE OFFSHORE SUBSEA PIPELINE

The project consists of 8.92 km OFFSHORE sections for a 50 years of life span. The offshore pipe laying and Installation Methodology, Design and Engineering are done by M/S SB Marine Consultant, Mumbai.



Pipe laying plan at Gulf of Kutch as per survey

The offshore pipe laying starts at LFP via Nakti creek up to disposal point. Conventional pipe laying has been carried out on board of the pipe lay barge but in intertidal zone there was problem due to nonavailability of water depth. Causeway with a side trench have been made to pipe make-up, joining, lifting and shifting to the trench for towing during high tide.





The launched string is being towed from LFP causeway point to offshore flange connection point by tug boat during high tide condition.

Once the string is reached offshore point the flange to flange connection will be done with the previous pipe section. For this flange to flange connection, the string mouths have to be lifted from water surface to the platform made at side of the barge where specially designed davits are fabricated and installed on deck barge. The lifting procedure is shown in below figures.



132m long String lanching from causeway to water





Once the flange to flange is completed the pipe section has to be prepared for lowering in the seabed. The string has to align in line with the trench. Side anchors and assistance of small boats have been taken for any lateral shift due to high current. One the pipes are submerged to the trench and buried, the stability at seabed has been ensured.



For string lowering on to seabed, float and sink method is followed, and the lowering operation is S-laying.



Conventional S-lay installation sketch

SB Marine has given each and every design and inspected the fabrication as well as entire process from concept, design, methodology and installation engineering.

#### **DIFFUSER DESIGN AND INSTALLATION**

At disposal point after 8.92km pipe laying, the diffuser to be fitted has been designed by SB marine. This was to ensure the exit pressure, stability at sea-bed for the life span, no back flow and other risk factors. The diffuser design is done as per DNV-RP-F109 code,. and as per approval of NIO & IITM.



The diffuser installation is a critical operation since the riser pipes can get damaged if the handling is hard. To avoid such damages, a lifting frame has been designed by SB Marine for safe installation at 60 ft water depth.



Diffuser lifting Frame for safe installation



Diffuser Marker Buoy

Marker buoy with anchoring blocks are provided to avoid any accidental access at the diffuser location.

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## ENGINEERING AND METHODOLOGY FOR REPLACEMENT JOBS FOR ONGC OFFSHORE PLATFORMS

SB Marine has executed Engineering and Methodology for four replacement works on ONGC various offshore platforms, GOL Offshore as contractor. The four replacement works has been done by SB Marine Engineering support and also SB Marine team has visited the locations to check the feasibility of replacement. Not only engineering methodology SB Marine involved in transportation analysis, mooring analysis, sea fastening & lifting analysis for this particular jobs. The four replacement scopes are,

- 1. SUMP CAISSON REPLACEMENT
- 2. FG SKID REPLACEMENT
- 3. 42 INCH VALVE REPLACEMENT
- 4. WELL STIMULATION COOLER

The engineering and methodology was done by considering all the risk factors and submitted to GOL offshore and ONGC for execution of the replacement. To assess the feasibility and risk factors SB Marine team visited relevant platforms and locations. Following description gives brief summary of each replacement.

#### 1. SUMP CAISSON REPLACEMENT

Sump Caisson is a long vertical cylindrical section with multiple parts, total weight is about 38.53 MT and longest section has length of 13.49m and weight of 8.71 MT. Sump Caisson is located on BLQ-2 platform at cellar deck (EL18400), and it is extended from cellar deck to 43663 mm vertically downward and it is 1500 mm from longitudinal Fr. 2 and 2000 mm from transverse Fr. B. The sump caisson images are shown in following images while transportation.



The sump caisson

sections sea transportation is carried out with barge and the shifting from barge to platform done by crane barge GAL Constructor. The BLQ-2 platform has its own pedestal crane but it is not accessible to sump caisson replacement location so we have proposed new crane for this operation.



Replacement skematic picture using crane barge

For the replacement of sump caisson the existing deck is not sufficient to clear the deck in elevation point of view, so SB Marine proposed to extend the deck in horizontal direction with trolley beam. The strength assessment and construction drawings are prepared for the trolley beam also existing deck strength assessment is carried out for the replacement.



#### 2. FG SKID REPLACEMENT

On the BPB offshore platform The Fuel Gas conditioning skid (FG skid) is located on cellar deck at EL18400, in-between the longitudinal frames 2 and 3 and transverse frames B and FB. This fuel gas conditioning skid consist of pre heater, fuel gas scrubber and super heater shall be replaced along with all instruments, local SDP, piping valve etc. This existing skid is replacing with new one.



The existing FG Skid removal and new FG Skid placing is done by SB Marine engineering and methodology documents. The lifting, transportation, new structure proposal has be given as below pictures.



#### 3. 42 INCH VALVE REPLACEMENT

On the BPB offshore platform "42 Inch Valve" is located on top deck at EL37764, in-between the frames 1.3A to 2A.The replacement of old valve with new valve is done by using crane barge with some modification to the existing deck structure of BPB platform.



Existing deck structure modification sketch



#### 4. WELL STIMULATION COOLER

On the BPA offshore platform there are three well stream coolers (E2752, E-2753A&B) on main deck at EL. 27500. The well stream coolers are located inbetween the frames 1 to 2 and A to A1. Out of these three, two well stream coolers (E-2753A & E-2753B) are replacing with new one.







**BUCKET GRAB DREDGER** 



COASTAL SEA GOING TUG BOAT



LINK SPAN FLOATING PONTOON JETTY



**MODULAR CRANE BARGE** 



**50M FLAT TOP MATERIAL BARGE** 



2000 CUM SELF PROPELLED SPLIT HOPPER BARGE





JACK-UP BARGE FOR PILING OPERATION



**BATCHING PLANT BARGE** 



**BATCHING PLANT BARGE** 



**BERTHING FLOATING JETTY** 



JACK-UP BARGE FOR PILING OPERATION





JACK-UP BARGE FOR SOIL TESTING



**SPLIT HOPPER BARGE** 



LINK SPAN FLOATING PONTOON JETTY



SELF PROPELLED SPLIT HOPPER BARGE



**MODULAR CRANE BARGE** 



2000 CuM Split Hopper Barge



## **ENGINEERING & METHODOLOGY FOR INSTALLATION OF CAISSONS**

The project is for the construction of hydro-technical structures for phase-2 of KKNPP. The site is located at Radhapuram taluk of Tirunelveli district of Tamilnadu. The kudankulam site is a coastal site on the shores of the Gulf of Mannar located on the southeastern tip of India near Kanyakumari.

The project includes construction of the seawater intake pipeline or caissons which consists of six caissons: four water passage units and two adjoining units for conjugation with the breakwater dyke. The caissons are rigid, thin-wall box-type structures of cast in-situ reinforced concrete. Initially, the caissons will be cast within temporary dyke dry working area and will be floated by breaching of the temporary dyke. Then caissons will be finally located within the breakwater dyke at its southern portion.

The methodology and the engineering required for the float-over, transportation and installation of the caissons at the breakwater dyke is done by M/s SB Marine Consultants, Mumbai. We assisted the L&T Hydrocarbon Engineering Ltd. for the feasibility of Caisson structures as designed by the client and also in elimination of various equipment, facility and modifications needed. This includes the stability analysis, Motion analysis, Mooring analysis and towing analysis with a proper sequence and the other structural calculations.



Key plan of the caissons at breakwater dyke



Installation at final location





All Caissons at final position





20 Ton Bollard Pull Unrestricted Sea Going Tug





10 Ton Bollard Pull RSV 4 Tug

12 Ton Bollard Pull Harbor Tug







15 Ton Bollard Pull RSV 4 Tug



57 Ton Bollard Pull Harbor Tug





Design of Caisson Gate





2000 CuM Hopper Barge for Adani



**Unrestricted Tug for Mumbai Client** 



Multi Utility Craft for Adani





Concept Design of 1500 CuM Hopper Barge for Damen Shipyard



BV Approved Plan of 2375 CuM Hopper Barge for Wasa Dredging, Finland







1000 CuM Hopper Barge for Yogayatan Port, Mumbai





30x18M Jack-up Barge for ITD Cementation



Load out and Transportation analysis of Jacket Structure



Lifting and Assembly Procedure of Jacket Structure