

**CHM**  
GLOBAL

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## MARINE & OFFSHORE CONSULTANCY SERVICES

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# About The Company

CHM Global offers a wide range of services that could be of great help to your organization. Simply put, we have aimed to be the one-stop solution for all matters of marine in Qatar and now are expanding into the ME.

We are licensed to provide services including advisory, consulting, and loss adjusting. We can provide tailor-made solutions for challenges faced with newbuilds and older vessels with conduct trials of machinery, inspecting lifting gear, handling DG cargo etc.

We can also prepare method statements for unique activities based on our long-standing experience with all the major players in Qatar.

Our clients include all the major marine, oil and gas companies based out of Qatar and the Middle East. We have had an excellent track record working with Qatar Energy and other related companies in the same field.

We have always endeavoured to provide timely and high-quality service while maintaining consistency and reliability in what we deliver to our clients. We acknowledge that the area of work in which we operate requires professionalism and diligence and we strive always to build confidence with our stakeholders.

The team consists of young and qualified surveyors including Master Mariners, Marine engineers, Naval architects and senior cargo surveyors. The company is in compliance with the integrated Quality Management system as per ISO 9001, ISO 14001, & ISO 45001, ISO 17027.

# Our Profile

CHM Global team comprises of experienced and talented pool of professional engineers with hands on experience in the shipbuilding/oil & gas engineering industry who are capable of providing economic and practical solutions to complex offshore engineering activities. We aim to provide safe, efficient and cost effective engineering solutions to our clients by working closely with them and understanding their needs. Our focus is on delivering certainty and quality of the engineering works undertaken.

## Capabilities

### General Naval & Structural Engineering

- Vessel motion response analysis
- Air gap analysis
- Stability and longitudinal strength calculations
- Vessel upgrade studies and structural modifications
- Finite Element Analysis for Critical areas
- Naval Architectural Services including Basic and Detailed Design.
- Piping design for newbuild and repair projects
- Mechanical and Noise/Vibration Calculations
- Inclining Experiment, Preparation of Trim & Stability Booklet, Damage Stability calculations
- Preparation of Manuals (SSP, ISM, ISO, SOPEP, SMPEP, SSA, Cargo Securing Manuals & Garbage Management Plans)
- Tonnage, Load line, Freeboard & Longitudinal Strength Calculations & Re-Scantling Analysis, Safe Access to Bow, Towing Arrangement in compliance to OCIMF regulations
- Marine Electrical Consultancy Jobs, Electrical System Drawings
- Electronic Drafting, Drawing Retrieval/Redrawing, Verification of Drawings.

### Offshore Installation Engineering

- Tow analysis and seafastening/tie down design
- Mooring analysis (frequency domain/time domain methods)
- Engineered lift studies
- Rigging design and arrangement for offshore lifts
- Subsea structures deployment and recovery analysis
- Jacket launch, upending and docking analysis
- Loadout calculations
- Floatover analysis for topside installation.
- Installation Engineering Feasibility studies



### Subsea Pipeline and Flexible Engineering

- Pipeline installation analysis
- Cable/Umbilical/Flexible Installation analysis
- Beach pull engineering
- On bottom stability and free span assessment
- Global buckling assessment
- Riser analysis

### Fabrication and Production Department

- Ship building and repair (Hull and Piping).
- Conversions and modifications for all types of vessels.
- Blasting and Painting.
- Electrical services.
- Carpentry.
- Plant maintenance and repairs.
- New plant construction (structural).
- Shutdown maintenance.
- Installation and commissioning of engineering plants.
- Pressure vessels fabrication for process plants.
- Piping in process plants.
- NDT services.
- Engine and machinery overhauling.

### Project Management

- Third party review of installation engineering documents
- Project management consultants

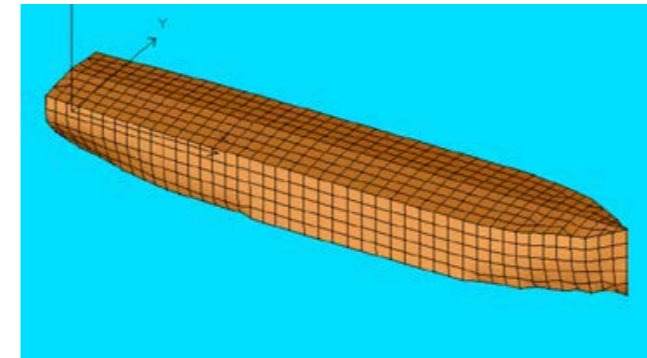


## Capabilities Description

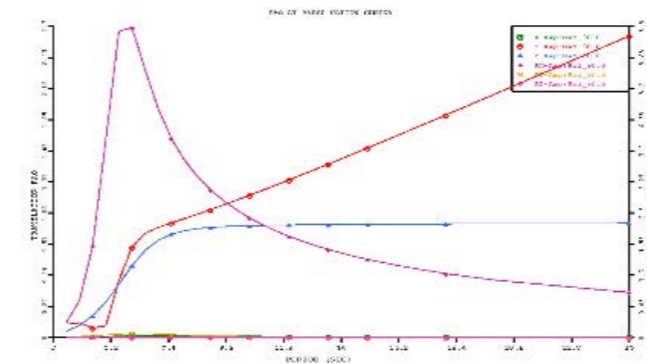
### General Naval & Structural Engineering

#### • Motion Response Analysis

Vessels are subjected to dynamic motions when exposed to ocean waves. Motion analysis is carried out by initially estimating the response amplitude operators (RAO) with the aid of high end hydrodynamic analysis softwares and subsequently utilizing the estimated RAO to evaluate the significant and maximum motions, velocities and acceleration response characteristics of a vessel.

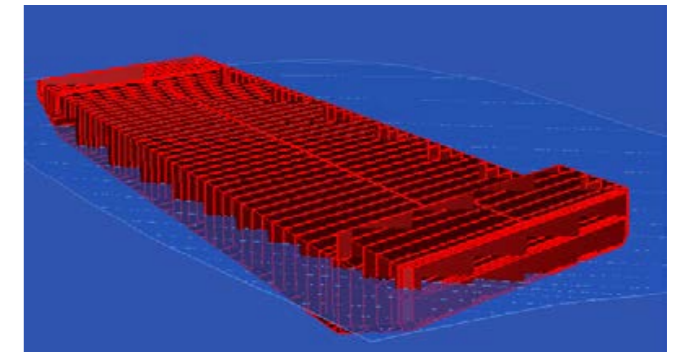
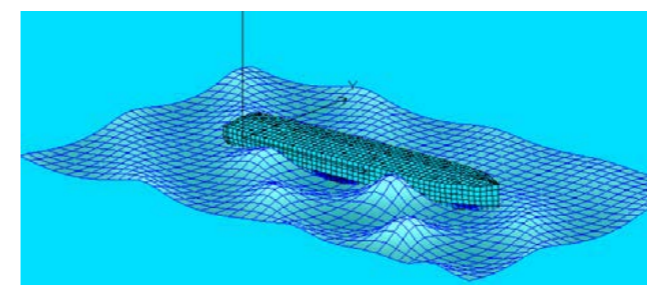


We can provide motion analysis for a range of vessel types exposed to random seas including barges, vessels, floater concepts such as semi submersibles, spars, TLPs, FPSOs etc. The outputs from the motion response analysis can be used to evaluate the natural periods of floater motions, significant and maximum motion response of the vessel in a required seastate, passenger comfort performance etc.



#### • Air Gap Analysis

Air gap defines the relative gap between the instantaneous water surface elevation and bottom of deck or any other relevant part of floater structure. Air gap analysis is of primary interest in case of deep draft floaters where the initial air gap at still water condition is relatively lower and also during transportation of offshore structures on transportation barges or vessels.



Air gap analysis is undertaken to evaluate the occurrence of slamming loads and wave impact loads due to a negative air gap owing to the relative displacements of the water surface and floater structural part in question under the action of ocean waves. The results of the analysis can be further used to determine the possibility of slamming events and if exists, to determine the impact area and design and ascertain the structural integrity against slamming loads for structural parts under evaluation.

#### • Stability and Longitudinal Strength Calculations

Our experienced naval architects are capable of executing stability and longitudinal calculations and prepare booklets for a range of vessels such as barges, tugs, platform supply vessels, tankers, bulk carriers, jackups, FPSOs etc. in compliance with relevant classification society rules and IMO regulations and other specific criteria required for special purpose ships. We are capable of performing intact stability calculations, damage stability calculations (deterministic and probabilistic methods) and longitudinal strength calculations with the aid of high end and widely accepted stability softwares.

#### • Preparation of Calculations, Manuals & Plans

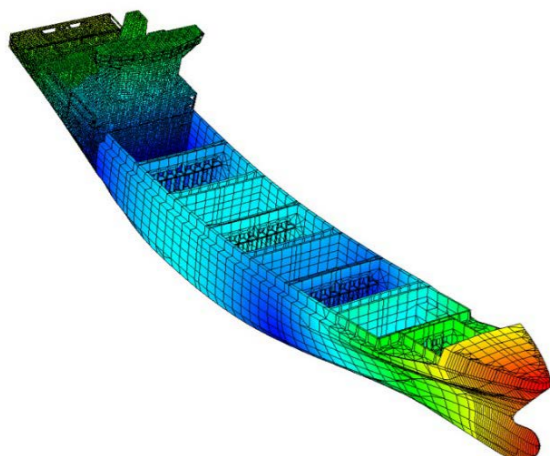
Our team of experts are capable of preparing various Calculations/Manuals/ Plans complying with the requirements of SOLAS ( Fire Control Plan, LSA & FFA plan, Emergency Towing Booklet etc), MARPOL ( SOPEP, SMPEP, SEEMP, Sewage Discharge Rate Calculation, GMP, ODSR etc), ILLC ( Freeboard Calculation, LL Plan etc.), ITC( Tonnage Computation), ISM Code( ISM Manuals), ISPS Code( SSP, Restricted Area Plan & SSA) and MLC Convention (DMLC Part II, MLC Manual etc.).

#### • Vessel Upgrade Studies

Vessel upgrades are inevitable based on project specific requirements and execution philosophy. With our experience in marine and offshore engineering industry, we are capable of undertaking vessel upgrade studies and structural & piping modifications and developing upgrade designs ranging from conversions including deck cargo barge to pipelay/cable lay barge or accommodation barge, mooring systems upgradation, ballast system upgradation, barge structural modifications etc. in accordance with project and client specific requirements.

**• Finite Element Analysis for Critical Areas**

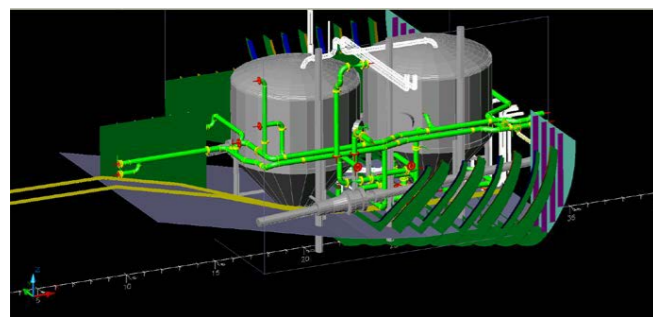
Our consultancy team can undertake and perform structural analysis to verify the structural integrity and adequacy in way of critical areas such as crane pedestals, helidecks, heavy equipments etc. with the aid of finite element analysis using high end FEA softwares. We are capable of performing global finite element analysis and local finite element analysis. We can perform both linear and nonlinear analysis and are capable of generating and executing FEM models based on beam elements and 2D/3D shell elements depending upon the criticality and complexity of the analysis needs.



We have an excellent infrastructure of international standards, modern communication facilities, experienced personnel, and a vast and authentic data base of information to cater the needs of our clients.

**• Piping Design for new build and repair projects**

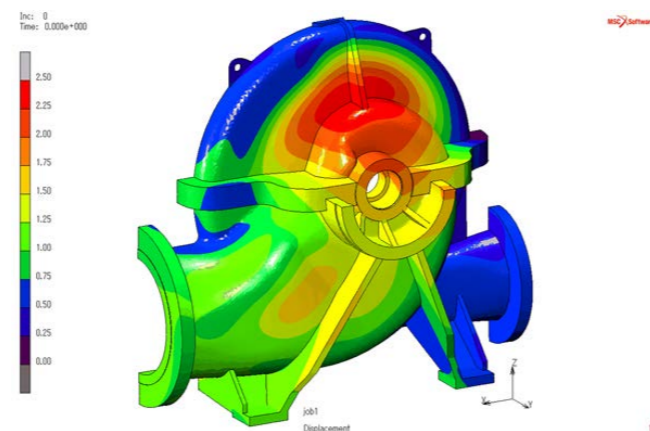
We have a team of highly experienced mechanical engineers who are capable of producing shipboard schematics required for new build vessels in accordance with various Classification Society Rules. We are capable of producing piping schematics as a turn-key package for new build vessels as per Client instructions/requirements. Besides, our in-house design team is capable of producing piping schematics for repair/conversion projects as per Client requirements or modifications in situ. All drawings are produced ready for Class approval. Software: Pipeflow Expert & ShipConstructor.



**• Mechanical and Noise/Vibration calculations**

Our expertise in the Mechanical department allows us to offer you customized packages for various mechanical problems. To begin with, we are able to offer

propulsion arrangement, shafting alignment drawings as well as chockfasting calculations for approval by Classification Societies. We are also able to offer you onboard visits during engine alignment, shafting installation and critical equipment installation to ensure that all standard procedures are adhered to.

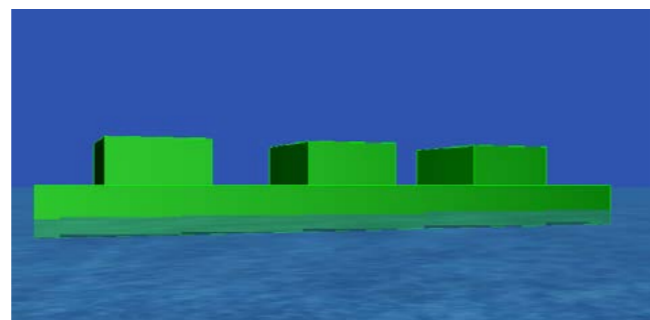


We are also able to provide consultancy services for noise and vibration problems. We are able to produce drawings to mitigate onboard noise in accordance with latest IMO rules. Using sophisticated software, we are able to carry out vibration analysis of hull and machinery components (shafting, propeller, main engine, gearbox) to advise on any related issues. Our vibration experts can do on-board visits to inspect and provide expert opinion related to vibration issues.

**Offshore Installation Engineering**

**• Tow Analysis and Seafastening/Tie Down Design**

Our consultancy services can provide tow analysis complying with applicable marine warranty surveyor (MWS) guidelines and client specific requirements to determine an optimum towing draft and floating condition for the transportation vessel for ocean tow, ballast requirements for the tow, tow stability analysis, longitudinal strength checks for still water, hogging and sagging conditions, bollard pull estimations for ambient sea and storm sea conditions for selection of suitable tugs and design of tow equipment and towing arrangement plans.



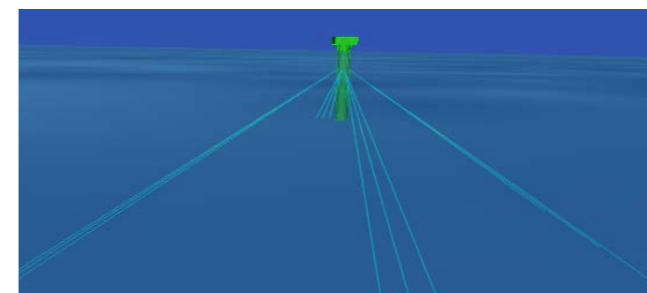
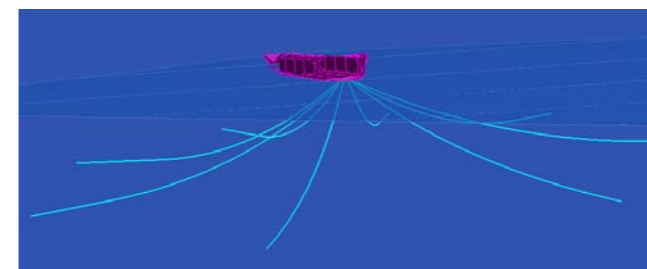
During transportation, the transported structure is subjected to dynamic loads owing to the vessel motions when exposed to ocean waves. The transported structure, therefore, needs to be suitably seafastened and tie downed to the deck to prevent its loss at sea. We can carry out seafastening analysis to design the seafastening and tied down members to sea

fasten the transported structure to the deck. The dynamic loads used to design the seafastening/tie down members can be based on MWS standard motion criteria or based on the maximum motions of the vessel at the worst anticipated seastate along the tow route deduced from vessel motion response analysis.

**• Mooring Analysis**

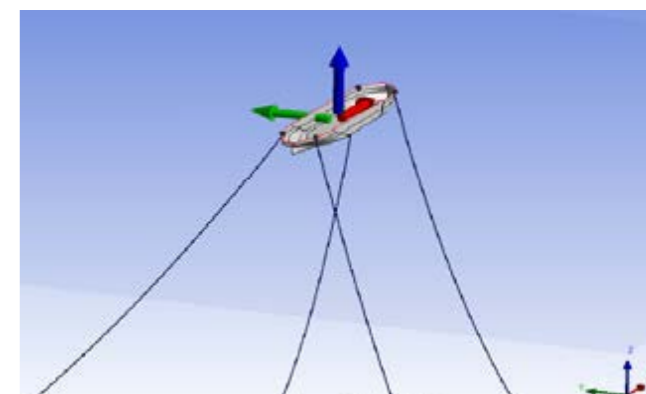
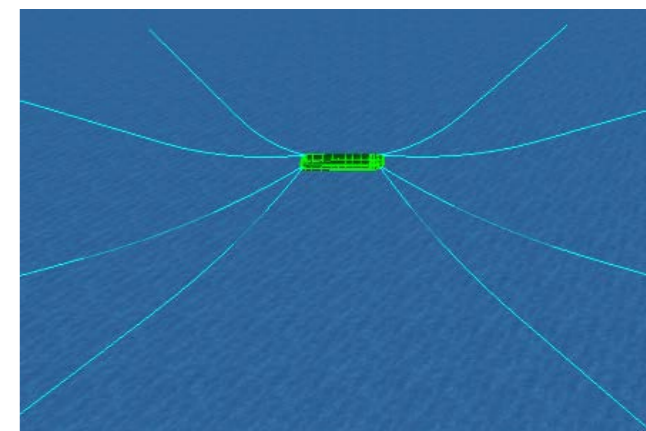
With our expertise in the marine and offshore engineering industry, we are capable of undertaking and performing mooring analysis for permanent mooring systems and mobile mooring systems as per the requirements of API-RP-2SK, DNV POSMOOR and other recognized industry standards and incorporating client specific requirements. We can carry out mooring analysis using frequency domain analysis methods or more realistic time domain analysis methods with or without the inclusion of mooring line dynamics.

For permanent single point/turret mooring systems and spread mooring systems, we can undertake the mooring system integrity assessment for the operating and storm sea conditions covering:



- Catenary plots showing clearance checks from subsea assets.
- Mooring line strength analysis (intact and damaged) and fatigue analysis
- Maximum vessel offsets due to environmental loads
- Anchor Holding capacities and anchor uplift checks
- Transient analysis to capture the transient excursion in one line damage scenario.
- Coupled mooring analysis including the effect of risers

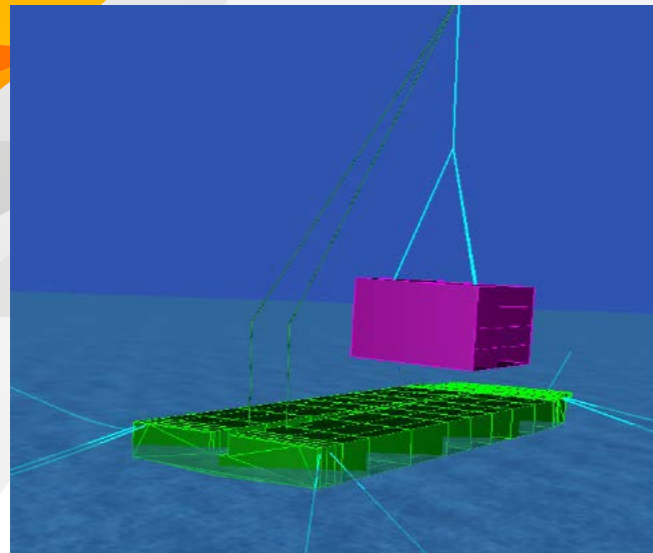
Mobile mooring systems or temporary moorings are frequently used to maintain the station keeping of vessel during offshore structural installations. For temporary mooring systems, we aim to provide the following services as mentioned below:



- Design of mooring spread for structural installations.
- Catenary plots showing clearance checks from subsea assets.
- Mooring line strength analysis (intact and damaged) and maximum vessel offsets.
- Clearance checks between installation vessel and existing nearby structure.
- Anchor Holding capacities and anchor uplift checks
- Transient analysis to capture the transient in one line damage scenario.
- Determining the limiting seastate for the mooring system
- Redesign and optimize mooring spread to achieve a higher limiting seastate
- Mooring analysis for pipelaying operations taking into account pipelay tension.
- Multi body moorings and tug assisted moorings.

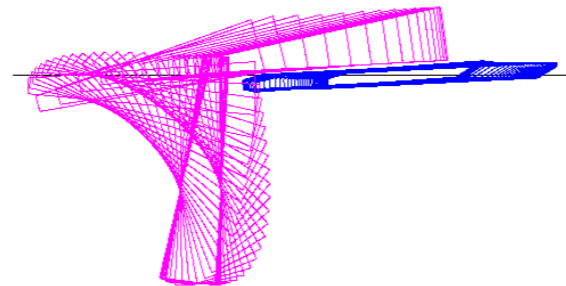
**• Engineered Lift Studies & Rigging Arrangement Designs**

Lift analysis is mainly undertaken to ascertain that the dynamic amplification factor (DAF), the crane cross angle, vertical excursion of the crane boom tip etc. are within allowable limits based on specification of crane manufacturer and client specific requirement. In addition, pendulum instability checks for the lifted structure needs to be evaluated in order to ascertain that the lift can be performed at wave periods present at the site. We can carry out dynamic analysis to establish a limiting weather envelope satisfying the above mentioned requirements to carry out the lift operation safely and without exceeding the crane utilization capacity taking into account the DAF.

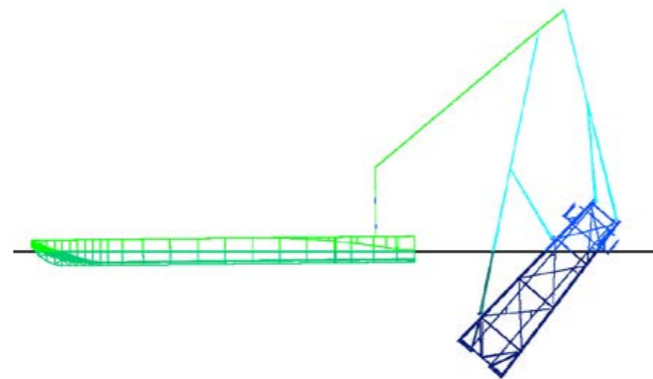


#### • Jacket Launch, Upending & Docking analysis

A cost effective and elegant way of floating substantially large and heavy jacket is to launch the jacket from a launch barge. We can perform jacket launch analysis complying with the marine warranty surveyor guidelines and client specific requirements and the analysis aims to provide the following checks for the launch such as barge ballasting requirement for arriving at launch floating condition, jacket push/pull force required to commence launching, rocker arm reaction loads estimation, jacket launch trajectory and dive depth, reserve buoyancy checks and sensitivity studies for jacket cog positions and friction coefficients etc.



Jacket upending analysis aims to provide a detailed analysis covering the entire process which involves lifting off from the cargo barge, lowering it into water and upending it to vertical position. Our upending analysis covers the following aspects with respect to upending process such as jacket configuration during various stages of upending process, evaluation of jacket clearances to barge and seabed, sling loads, hook loads and crane capacity utilization factors, reserve buoyancy checks, sensitivity studies for jacket weight and cog positions and damage case study to assess accidental flooding of critical compartment and requirement of controlled jacket leg flooding during upending process.

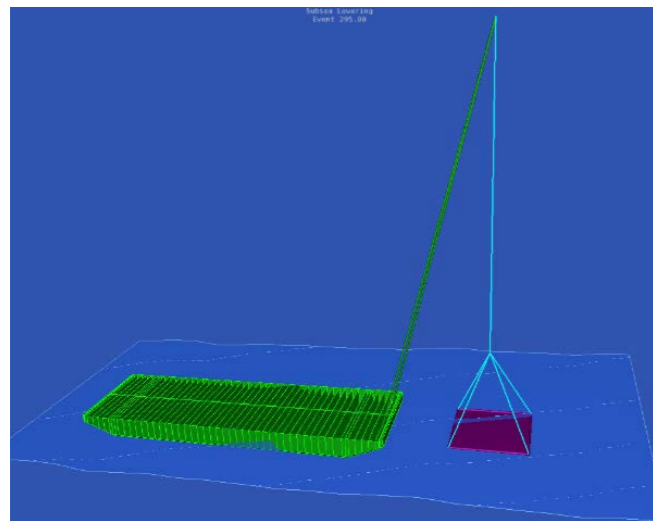


Jacket docking analysis needs to be carried out to assess the impact mating load between jacket and pre-installed piles or conductor. The docking analysis aims to establish a limiting seastate to carry out the docking operation without exceeding the allowable docking load.

We can also perform rigging arrangement design covering the development of rigging arrangement drawing, selection of rigging slings and rigging components, structural design and adequacy checks for padeyes and trunnions and hook prong checks for eccentric loadings.

#### • Subsea Structures Deployment & Recovery Analysis

Subsea structures deployment and recovery analysis is undertaken to estimate the dynamic loads on the slings and associated equipment during lowering or recovery operations. We can perform the subsea lowering analysis using the simplified approach as stipulated by DNV-RP-H103 or detailed fully coupled dynamic analysis covering all important stages of lowering or recovery operations as mentioned below:



- Lift in Air
- Lift through splash zone
- Lift in water
- Lowering on to seabed
- Lifting off from seabed

Resonance checks during the lifting and lowering operation can also be verified. The analysis aims to establish and quantify the limiting seastate for the installation or recovery of subsea structures.

#### • Floatover Analysis for Topside Installation

The floatover installation method is usually employed when the module lift weight exceeds the capacity of the available derrick barges. The outcome of the floatover analysis study aims to provide the following:

- Ballast pattern during various stages of operation
- Vessel stability analysis during tow and floatover operation
- Mooring system integrity analysis during floatover operation
- Barge excursions and relative motion between lifted module/jacket/barge
- Loads on mooring lines, soft lines, fenders, LMUs and DSUs
- Limiting seastate for the floatover operation

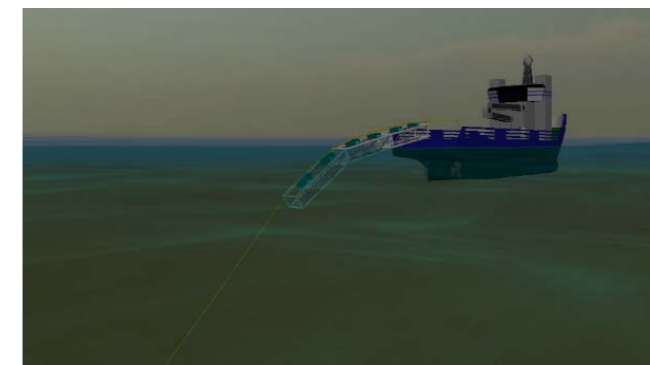
#### • Loadout Calculations

Loadout calculations are needed to verify the stability and longitudinal strength of the loadout barge is within acceptable limits during each of the critical stages of loadout for the minimum and maximum permissible drafts, determine the tidal window for the loadout operation defining the safe maximum and minimum values.

### Subsea Pipeline and Flexible Engineering

#### • Pipeline Installation Analysis

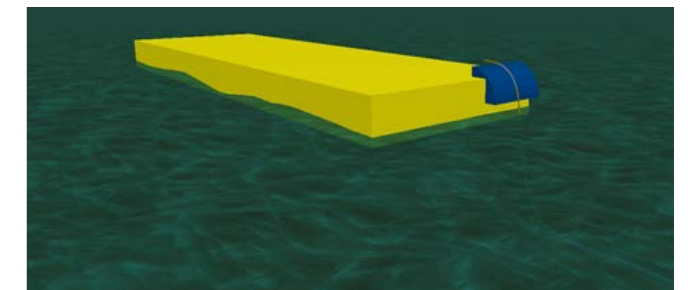
Offshore pipeline construction is based on a moored or dynamically positioned lay barge. The lay barge moves ahead as individual pipe joints are welded onboard. Pipelay installation analysis is carried out to finalise and optimize the lay parameters of the pipelay barge and stinger and to demonstrate the safe and successful installation by ensuring that the pipe stresses are within acceptable limits at any point during the installation activity as per the requirements of applicable codes and standards and client specific requirements. With respect to pipelay installation analysis, our analysis report covers, but not limited to, the following studies such as static pipelay analysis to establish the pipelay profile and required tensioner capacities along the lay route, dynamic pipelay analysis to evaluate the limiting seastates to carry out the pipelay operation without overstressing the pipeline, sensitivity studies for various lay parameters such as tension, stinger elevation, current, trim etc., startup analysis checks and arrangement, abandonment and



recovery analysis, pipeline lift analysis, weld repair analysis etc.

#### • Cable/Umbilical/Flexible Installation Analysis

The cable/umbilical/flexible pipeline is normally laid either from a reel or a carousel through a tensioner and over a chute on the installation vessel. Flexible installation analysis needs to be carried out to determine the optimum lay parameters for the installation vessel and to demonstrate and ascertain that the cable/umbilical/flexible can be installed safely without infringing any of its design parameters and the loads on the cable and its material bending radius are within acceptable limits. Through analysis, we aim to provide the following, but not limited to, such as the lay profile, tension at the touchdown point, departure angle range of the chute, evaluation of force required to pull the cable/umbilical through J-tubes, transpooling analysis to ensure that the cable/flexible material bending radius are within tolerable limits during the transpooling operations etc.

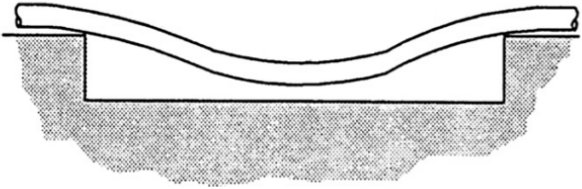


#### • Beachpull Engineering Analysis

Pipelines and cables at shore sections are normally installed by beach pull method. In this method, the barge is stationed at a point where adequate water depth is prevailing. The pipeline is pulled either from the barge or from the shore using a winch. Beachpull analysis is carried out to determine the lay profile to keep the pipeline stresses or strains within acceptable levels, required pull force and supplementary buoyancy to limit the pulling force within the winch capacity, to estimate the lateral displacement of pipeline due to the combined action of waves and current near shore.

#### • On Bottom Stability Analysis & Free Span Analysis

On bottom stability analysis needs to be carried out locations along the pipeline route where significant variations in pipeline alignment, water depth, wave heights, current or soil types occur. The objective of the analysis is to evaluate the required submerged weight of the pipeline along the route and ensure that the design submerged weight is always above the required value. Concrete coating thickness is adjusted to increase the design submerged weight. We are capable of performing on bottom stability calculations for the pipeline according to DNV-RP-305/DN-V-RP-F109 design codes.



Free spans along the pipelay route are caused by seabed unevenness, change of seabed topology, artificial supports/ rock beams etc. For free spans occurring along the lay route, free span corrections is a primary option. However, if corrective measures are

not feasible, a free span assessment study addressing the pipeline structural integrity with respect to fatigue loading and local buckling needs to be performed. We can perform free span assessment as per the guidelines stipulated in DNV-RP-F105 design code.

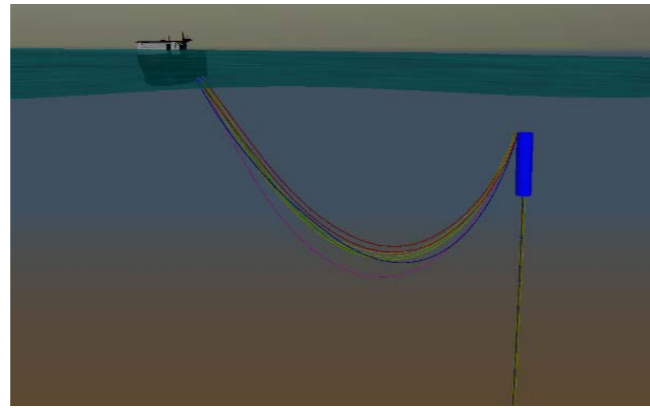
#### • Global Buckling Assessment

Subsea pipelines are increasingly designed to operate at higher pressures and higher temperatures. As far as the global buckling phenomenon associated with pipelines, high pressures and high temperatures are potential factors that act as the driving force for the onset of global buckling. We are capable of analysing the potential of global buckling by evaluating the effective axial force build-up along the pipeline route and to subsequently evaluate the possible mitigation measures to prevent the onset of global buckling phenomenon.



#### • Riser Analysis

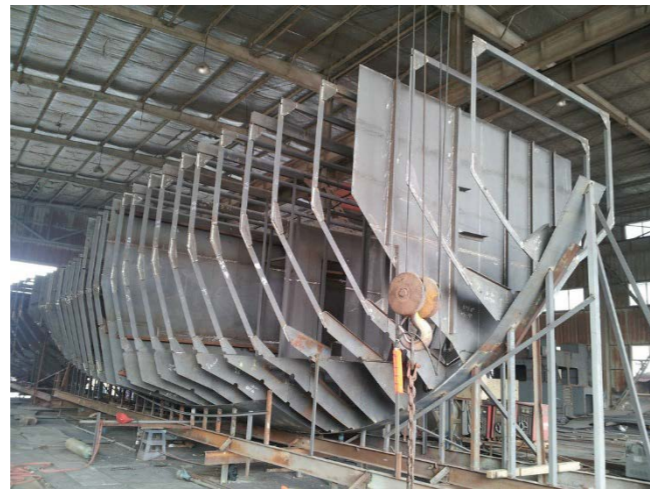
Offshore riser systems are steel/flexible pipes specifically designed to transfer the formation fluid from the pipeline at the seabed to the processing platform at the surface. We are able to undertake and execute global static and dynamic analysis of production and drilling riser systems and covering all types of riser configurations such as SCRs, TTRs, hybrid risers, flexible risers etc. We aim to provide and estimate the following response quantities as output from a global riser analysis which are cross sectional forces/moments, global riser deflections, global riser positions, reaction loads at termination structures etc.



### Fabrication and Production Department

Fabrication and Production department provides an integrated field construction and repair services across the engineering industry viz. ship repair and new build, plant maintenance and new construction which include project management, project planning, quality assurance and supervision Constituting Naval architects, Marine engineers, Mechanical Engineers etc. with a multi-talented workforce in India and overseas.

Through our in-house engineering and design services, we provide each and every client with a dedicated, integrated service. Our team is developed to handle repair, refit and conversion for all types of marine vessels. We work around the clock to deliver high quality services at competitive prices and within swift delivery schedules, ensuring your immediate and long-term needs are always met.



#### Our services includes:-

- Ship building and repair (Hull and Piping).
- Conversions and modifications for all types of vessels.
- Blasting and Painting.
- Electrical services.
- Carpentry.
- Plant maintenance and repairs.
- New plant construction (structural).
- Shutdown maintenance.
- Installation and commissioning of engineering plants.

- Pressure vessels fabrication for process plants.
- Piping in process plants.
- NDT services.
- Engine and machinery overhauling.

### Project Management

#### • Third Party Review of Installation Engineering Documents

Our consultancy services offer third party review of offshore installation engineering documents to ensure and appraise quality of engineering works carried out covering naval engineering, pipeline engineering and structural engineering documents that are relevant to transportation and installation activities. These documents can be very closely scrutinized giving attention to details for compliance with the applicable MWS guidelines and client specifications.



#### • Project Management Consultants

We offer project management consultants services for offshore transportation and installation projects on behalf of clients or installation contractors. We can act as a focal point and interface between client, installation contractors and warranty surveyors. We can assist our clients in the preparation of design basis and technical specifications for transportation and installation projects. We can help our clients to identify all engineering deliverables required to carry out the installation activities and warranty survey approvals are obtained for the same. We can assist our clients to ensure that all project schedules and milestones are properly planned and are met at all stages of the project execution.

