

**Delivering success
through capabilities
and experience**



About Merizen

Merizen is an infrastructure consulting company that leverages upon global network, deep market knowledge and a workforce comprising industry’s brightest minds to deliver cost-effective and sustainable solutions.

Since its inception in 2006, Merizen, formerly known as BMT India, has steadfastly travelled the path to leadership position in India’s ports & logistics sector through its global capabilities and local expertise.

As an independent company with growing ambitions in the Indian market, Merizen is constantly expanding horizons in other infrastructure sectors.

16+
years of
dominant
presence in India

500+
projects in
India and
abroad

200+
sites visited
and
studied

250+
years of
combined
experience

30+
qualified and
experienced
team members

Your Single-point of Contact for Winning Solutions

Merizen is uniquely positioned to deliver through life solutions, from concept to commissioning, for ports and logistics infrastructure.

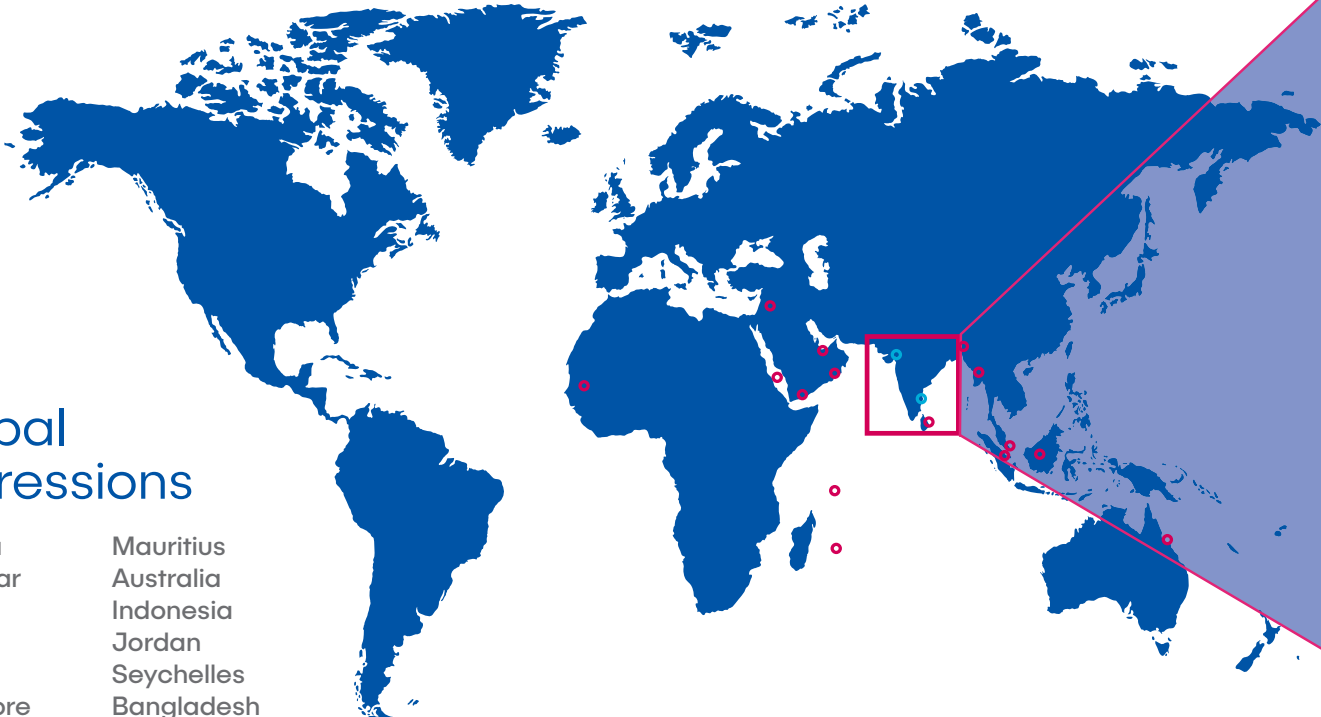
With offices in Ahmedabad, Mumbai and Chennai, we provide sustainable solutions that enable productive decision-making and substantial value-addition to our Indian and International clients. Our strong team of professionals is equipped to deliver excellence on all aspects of port development projects.

Services We Offer

- Pre-feasibility Studies
- Market Research and Trade Forecasting
- Business Plans
- Master Plan and Land Use Planning
- Due Diligence and Advisory Services
- Detailed Project Reports
- Preliminary Engineering
- Detailed Engineering
- Procurement and Bid Process Management
- Project Management
- Navigational Simulation
- Model Studies for Port Developments
- Environmental Impact Assessment
- Materials Handling System Design

Global Impressions

- | | |
|-----------|------------|
| Srilanka | Mauritius |
| Myanmar | Australia |
| Oman | Indonesia |
| UAE | Jordan |
| Yemen | Seychelles |
| Singapore | Bangladesh |
| Malaysia | Senegal |



Project Experience

- Container Terminals
- Bulk Terminals
- Liquid Terminals
- LNG Terminals
- Fishery Harbours
- Multi Purpose Port Developments
- Marinas
- ICDs / CFS
- Logistics Parks and SEZs
- Cruise Terminals
- RO-RO and Car Export Terminals
- Coastal Defence and Breakwaters

Our Clients

- Port Developers
- Port Operators
- Lenders and Financial Institutions
- Prospective Investors
- Logistics Operators
- Port Authorities
- Government Agencies

Project Identification and Conception

Master Plans and Detailed Project Reports (DPR)

Master Plans and Detailed Project Reports (DPR) define the roadmap for infrastructure planning and development including suggesting measures for adapting in accordance with future traffic growth, expansion, use of new technologies and other factors. Our team at Merizen evolves master plan and prepares detailed project reports for ports and logistics infrastructure that can facilitate in achieving significant improvement in the whole facility system including fair utilisation of available resources, seamless handling operations and enhancement in hinterland connectivity, among other benefits.

Feasibility Studies

We have prepared a number of high-profile container, bulk and cruise port feasibility studies. We assist clients with selection of ideal project sites and provide layouts and development plans for both specific new developments and the reconfiguration of existing ports.

Trade Forecasting and Market Research

We undertake and review traffic forecasts for ports and logistics infrastructure. We use a wide range of methods for forecasting including economic modelling of hinterlands, cargo origin and destination surveys and statistical trend analysis. Our subject experts also undertake detailed study to provide advice on the structure and level of port tariffs.

Economic and Financial Analyses

We conduct detailed economic and financial analysis of ports and logistics projects to enable developers and operators to make right investment decision and evolve robust strategic plan for the project. We are recognised in key international equity and debt markets as a leading consultant for techno-commercial feasibility.

Logistics Analyses

We provide advice and support to operators seeking to optimise their logistics chains. We conduct detailed study and analysis of supply chain components and provide effective and efficient logistics system to meet the clients' requirements for timely responsiveness, quality and creating value for products and services.

Detailed Project Report for the development of BSF jetty at Koteswar, Gujarat

Client: **Gujarat Maritime Board on behalf of Border Security Force**

Site selection and feasibility study

- Identification of suitable site options
- Site assessment
- Vessel size analysis
- Operating considerations and functional requirements
- Conceptual master plan
- Evaluation of alternative sites
- Cost estimates and cost benefit analysis
- Recommending preferred site location

Detailed Project Report (DPR) for the necessary infrastructure at the selected site.

- Surveys and investigations
- Master planning
- Model studies
- Preliminary engineering
- Detailed cost estimation
- Project schedule

Pre- feasibility Study for development of liquid handling facility at Gopalpur Port

Client: **Gopalpur Ports Ltd.**

Feasibility of developing and operating liquid terminal, comprising the following:

- number of jetties
- location of the jetties
- multiple jetties inside the harbour
- design vessel size
- dredging requirements
- terminal configuration
- landside requirements including area for storage and regasification
- pipeline network within and outside port premises
- cost estimation for development of the facility

Traffic study for the development of Haldia Dock- II (North) at Shalukkhali, West Bengal

Client: **Concast Hyundai Haldia Port Pvt. Ltd.**

- Port site assessment
- Macro- economic overview
- Review of industrial developments
- Review of connectivity infrastructure
- Hinterland analysis
- Competition analysis
- Evolution of potential cargo-mix
- Assessment of traffic potential for the next 15 years



PPP Development and Implementation

We assess existing public ports and advise on strategies for corporatisation and privatisation. Merizen assists in the analysis of key decision-making areas including:

- Split of commercial and regulatory functions
- Development models for privatisation
- PPP structuring, procurement and implementation
- Policy review and formulation

We have experienced team members and associates who have worked at senior positions in the government agencies and are capable of guiding and managing the privatisation process.

Technical Bidding Support

We have assisted a number of clients in conceiving winning development proposals. Our holistic approach to engineering solutions for marine facilities is underpinned by the global experience available within the company, supported by sophisticated design and optimisation tools at our disposal.

Our engineering capabilities include marine structural engineering, pavements, geo-technical engineering, environmental engineering, material handling systems, buildings, utilities and associated mechanical and electrical systems.

Pre-bid support for the proposed port development at Tajpur, West Bengal

Client: **JSW Infrastructure Ltd.**

- Site assessment
- Vessel size analysis
- Operating considerations and functional requirements
- Development of phase-wise master plan options
- Evolution of material handling system
- Assessment of dredge volumes
- Concept design
- Block cost estimation
- Comparative analysis of alternative master plans
- Recommendation of preferred master plan



Environmental Studies

We facilitate **environmental impact assessments** (EIA) for all types of port and terminal development. Our environment team can prepare and audit environmental policies and monitor landside, inter-tidal and marine habitats & environments for environmental degradation. We are also experienced in economic evaluation of environmental impacts and environmental degradation.

Environment Impact and Risk Assessment for the Floating Storage and Re-gasification Unit (FSRU) based LNG import terminal at Pipapav, Gujarat

Client: **Swan Energy Ltd.**

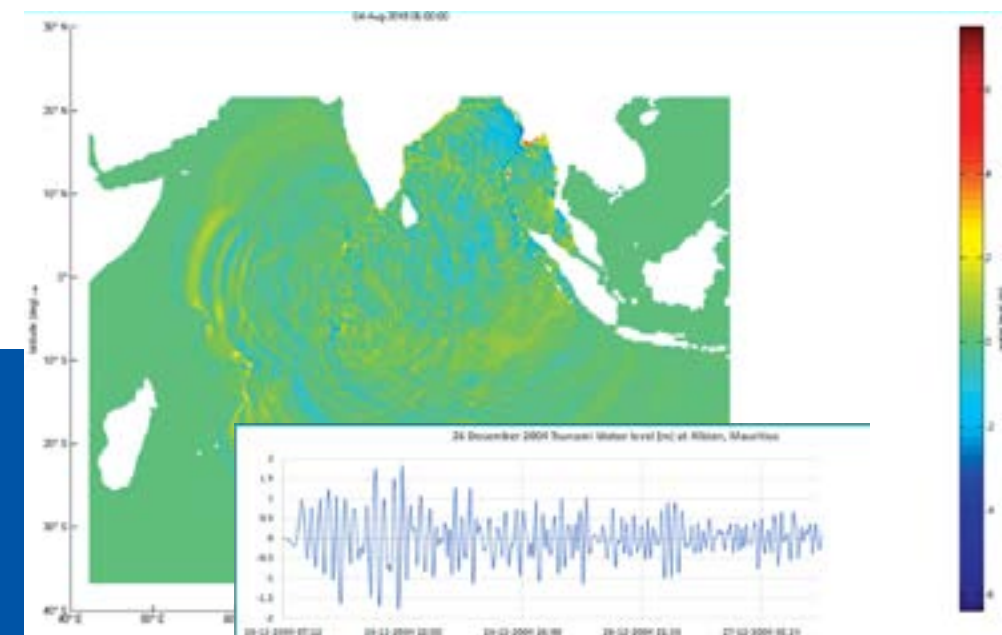
- Primary & secondary data collection for water & sediment quality and marine biology
- Assessment for presence of sensitive and/or ecologically critical habitats
- Impact on water quality from dredging and breakwater construction
- Impact on benthic ecology at disposal site and intertidal flora & fauna
- Impact of project activities against the baseline EIA studies
- Risk assesment and mitigation measures for LNG handling, storage and transport
- Disaster Management Plans

Coastal Environmental Modelling

We specialise in **developing programs** which can help in assessing and managing coastal environmental issues. Our team of professional engineers and scientists **regularly investigate** all facets of the physical and ecological coastal system.

We regularly undertake coastal studies including:

- Baseline data collection
- Investigations of coastal processes and erosion problems
- Advanced computer modelling (1, 2 and 3D) of waves, currents, water levels and sand transport
- Hydraulic and sedimentation studies of estuaries, ports and marine projects
- Port planning impact assessment studies
- Dredging and dredge material management strategies
- Sand bypassing investigations
- Coastline hazard definition studies
- Coastal management planning
- Tsunami modelling
- Persistence studies



Mathematical modelling studies, mooring analysis and navigation simulation for the proposed petroleum hub at Albion, Mauritius

Client: **Joint Working Group (STC, IOC, MRPL)**

- Mathematical modelling studies
- Wave tranquility studies
- Met-ocean study and finalization of environmental parameters
- Down time analysis
- Littoral drift assessment
- Cyclone & tsunami studies including estimation of highest flood levels
- Berthing studies including selection of fender system and optimization of hull & fender contacts
- Dynamic mooring analysis
- Selection of ORMH
- Navigation simulation studies
- Passing ship effect on moored vessels



Detailed Design, Supervision and Procurement

Merizen team delivers complete detailed design of ports and terminals of most varieties including container berths, bulk solid jetties, liquid jetties, LNG jetties as well as multipurpose berths. In addition to Indian codes, we design to a range of international codes. We also provide design review, proof consultancy and value engineering services. Further, we can prepare the complete contract documentation for different types of contracts ranging from 'design and construct' to 'construct only' projects.

Our team provides project management services to some of the largest port projects in India on regular basis.



Detailed design & construction drawings towards augmenting the capacity of Visakha Container Terminal at Vishakhapatnam, Andhra Pradesh.

Client: Visakha Container Terminal Pvt. Ltd.

- Preparation of design basis, tender drawings, technical specification and BOQ
- Bid evaluation and recommendations
- Detailed design and construction drawings
- Approvals from Independent Engineer
- Preparation and checking of as-built drawings submitted by the contractor
- Monitoring of BOQ prepared during Stage I (not to exceed more than 5%)



Project Management Consultancy and Quality Monitoring Services to Dhamra LNG Terminal Pvt Ltd (DLTPL) for their 5 Mtpa LNG Terminal Project

Client: Dhamra LNG Terminal Pvt. Ltd. (DLTPL)

- Overall project management
- Progress monitoring
- Review of temporary and permanent works
- Review of drawings
- Advising contractor on construction programme and implementation aspects
- Measurement of works
- Payments certification and valuation
- Assistance in commissioning
- Quality monitoring & control
- Value engineering

Material Handling Systems

Merizen offers valuable insights towards designing and deploying appropriate materials handling systems including machinery, yard planning, engineering design and design review. Our experience spans across all types of bulk material handling systems including coal, ores, fertilisers and chemicals.

Design review of the Coal Material Handling System (MHS) at Gopalpur port in Odisha.

Client: Gopalpur Ports Ltd.

- Preparation of tender package comprising of tender drawings, technical specifications and preliminary cost estimate
- Bid support by responding to bidders' queries
- Technical evaluation of bids
- Review and proof checking of detailed mechanical, electrical, civil and structural drawings & design for MHS system



Navigation Simulation and Mooring Studies

Our team has operational expertise to run the real and fast time **ship-handling & manoeuvring simulation** and **static/dynamic mooring** simulation with following applications:

- Manoeuvre rehearsal
- Ship performance and operational assessments
- Assessment of port arrangements (berths, channels, etc)
- Assessment of tug requirements
- Ship-handling training
- Incident investigations
- Mooring analysis
- Passing ship analysis



PC Rembrandt

We use BMT licensed navigation simulator- PC Rembrandt to evaluate options for harbour layout at planning stage. PC Rembrandt is also regularly and effectively used by pilots, ship operators, naval architects and port authorities for the assessment of:

- safe operating limits under varying environmental conditions, including under-keel clearance
- alternative methods of control, such as tugs and the optimisation of tug usage
- tug requirements for a given vessel under defined environmental conditions
- risks for new or proposed berths, terminals, approaches and channel design

PC Rembrandt also assists in:

- port familiarisation, manoeuvre rehearsals and verification of passage plans
- training of officers and pilots in ship-handling and wide range of ship types



OPTIMOOR

We use OPTIMOOR to conduct mooring analysis. OPTIMOOR is an industry standard software with emphasis on practical applications. The dynamic version (STS Module) makes use of a hydrodynamic model, which is developed in collaboration between Newcastle University and BMT. The ship manoeuvring theory is applied to mooring analysis to enable more accurate predictions of ship

movements involving dynamic excursions due to changing forces.

The software considers the effect of all the environmental forces, and the resulting motion of the vessel in all 6 degrees of freedom (surge, sway, heave, roll, pitch and yaw) are accounted for.

Mooring analysis at Merizen...

- checks the adequacy of vessel layout and mooring arrangements
- performs dynamic mooring analysis and calculate the maximum mooring loads on mooring equipment, fenders etc. with respect to the environmental conditions
- checks the loads on the mooring lines and bollards
- considers the effect of passing ship on the berthed design vessels
- validates the mooring configuration considering different OCIMF (Oil Companies International Marine Forum) and environmental conditions at the site
- establishes a safe operational limit criterion from the analysis considering the loads and motions in the mooring equipment
- provides a mooring layout drawing showing the number of mooring lines, bollard positions and fender positions

Technical and Commercial Due-Diligence

Investors including banks, venture capitalists, private equity fund owners, strategic investors, project developers and public authorities often need expert independent technical assessments.

We have expertise in risk management and operations necessary to undertake robust, structured, and defensible due-diligence studies. We investigate into the details of a potential investment including critical assessment of management processes, supply chain and operational capability, and expose and resolve any issues in advance of financial close, providing assurance that a project can deliver.

Operations Management

Our team has expertise in undertaking audits of port services, cargo terminals and other marine installations. These audits can cover a wide range of areas including operational efficiency, security, safety, training and environmental practices.

We also provide recruitment assistance, secondment of personnel and contract management services to support port operations.

We are experienced in preparing terminal operating manuals, drafts and advice on the implementation of good working practices for terminals, port services, procurement, project management and operations management. We can also develop and implement maintenance programmes for ports, harbour and marine terminals.

Emergency Plans, Risk Studies and Accident Investigations

Merizen's competent engineers and scientists are well equipped to develop emergency response plans, conduct threat and risk assessment concerning safety and security of ports and terminals and investigate accidents & disasters within ports and harbours.

Technical due-diligence and lender's independent engineer (LIE) services for the expansion of JSW multipurpose, common-user port at Jaigarh, Maharashtra

Client: Axis Bank

- Verification of project cost estimates
- Review on the cost benefit analysis for proposed transshipment
- Reporting of actual vis-à-vis planned financial and physical progress
- Project cost certification
- Verification of quality of construction vis-à-vis approved specifications
- Review of orders placed towards project completion
- Ascertaining status & validity of statutory and non-statutory clearances and approvals
- Review of project agreements, certificates, undertakings, contracts etc.
- Review of operations from COD
- Review of changes in implementation program
- Submission of quarterly progress reports



Projects by Merizen

Advisory Services

- Prebid technical support for development of multipurpose terminal off Tuna Tekra, JSW Infrastructure Ltd
- Pre-bid support for port development at Tajpur, West Bengal, JSW Infrastructure Ltd.
- Bid advisory services for FTWZ at JNPT, Maharashtra, Hidustan Infralog Pvt. Ltd.
- Bid support for Senegal Minergy port, Dakar, Johar , Afcons
- Technical Support for Concession Bidding of Simar Port, Shapoorji Pallonji

Lender's Independent Engineer (LIE) and Technical Due Diligence (TDD)

- TEVR for shallow water berth and coastal berth at Jawaharlal Nehru Port, Yes Bank
- TDD and LIE for Phase-2 expansion at Jaigarh Port, AXIS Bank
- TDD and LIE for development of FSRU based LNG terminal at Jaigarh Port, Lenders' Consortium led by Bank of Baroda
- TDD and LIE for development of coal export terminal at East Quay-1,2,3 at Paradip Port, EXIM Bank
- TDD for existing Gopalpur and Dharamtar Ports, Deutsche Bank
- TEVR for coal import terminal at Paradip Port, SBI
- TDD for coal terminal at Paradip, Kalinga International Coal Terminal Paradip Pvt. Ltd.
- TDD and LIE services for development of iron ore berth for handling iron ore exports at Paradip Port, JSW Paradip Terminal Pvt. Ltd.
- TDD and LIE services for development of Vizhinjam International Deepwater Multipurpose Seaport, Adani Vizhinjam Port Pvt. Ltd.

Environment and Energy

- Environment Impact Assessment for Jafrabad LNG Terminal, Swan Energy Ltd.
- Technical Due Diligence for Tunga Hydropower, Eredene Capital
- Environmental Due Diligence for Bhoruka Power Corporation, Darby India

Port Planning and Feasibility studies

- DPR for FSRU-LNG facility in Mumbai Harbour, S.P. Armada Clean Energy Ventures Pvt. Ltd.
- DPR for conversion of berth IX to container terminal at VO Chidambaranar Port, Tuticorin International Container Terminal Pvt. Ltd.
- Feasibility study for port along Mahanadi River and open coast in Odisha, Cetus Consulting Solution Services Pvt. Ltd.
- TEVR for revamping of West Quay-6 at Vishakhapatnam Port, Vishakhapatnam Port Trust
- TEVR for development of port at Subarnarekha, Subarnarekha Port Pvt. Ltd.
- DPR for mooring facility of BSF near Koteswar in Kutch, Gujarat Maritime Board
- Master planning for Salaya Port, Essar Bulk Terminal Salaya Ltd.
- Master planning for Essar Hazira Port, Essar Bulk Terminal Ltd.
- Technical support (Master Plan and Cost estimates) for Aden Free Trade Zone, Al Saeed Company, Yemen
- Site selection and master planning for development of captive jetty at Ras Al Khaimah, , Globex Ltd, UAE

Materials Handling at Port

- Design review of the Material Handling System (MHS) at Gopalpur port in Odisha, Gopalpur Ports Ltd.
- Material handling system detailed design for Abbot Point T0 - Expansion (Phase 1), Australia, Adani Group
- Technical audit and design review of conveyor system at Salaya, Essar Group
- Materials handling review for coal terminal at Dahej, Adani Group
- Materials handling review for coal terminal at Mundra, Adani Group
- Design review of Stacker Reclaimer at Dahej Port, Adani Group
- Design Review of Stacker Reclaimer and Grab Unloaders at Mundra Port, Adani Group





Detailed Design and Engineering

- Detailed Engineering for cargo berth at Kattupalli, Adani Kattupalli Port Pvt. Ltd.
- Detailed Feasibility report (DFR), FEED and BID package for the proposed third LNG berth at Dahej LNG terminal, Petronet LNG Ltd.
- Detailed design and review of design backup yard facilities, Gopalpur Ports Ltd.
- Engineering design of container berth, container yard and associated works for VCT II extension, Viskha Container Terminal Pvt. Ltd.
- Detailed design of seawall, reclamation & associated works for Mumbai Coastal Road Project - Package 2, Hindustan Construction Company Ltd.
- Detailed design of LNG terminal at Mundra, Adani Ports and Special Economic zone Ltd.
- Detailed engineering and design of breakwater at Mundra LNG, Adani Port and SEZ Ltd.
- Design and Supervision for development of sheltered fish landing centre at Darsait and Aint in Muscat , Triad Oman Consultants International Engineering Consultants LLC
- Design of Breakwater for Udangudi EPC bid, ITD Cementation
- Design of Breakwater for EPC Tender for establishment of captive coal jetty, ITD Cementation India Pvt. Ltd.
- Design review of breakwater rehabilitation works for the damages due to cyclone Fani at southern breakwater, Gopalpur Ports Ltd.

Navigation Simulation

- Wave tranquillity, mooring assessment and ship navigation simulation study for Phase II development works for Gopalpur Port
- Navigation simulation for Kattupalli port, Marine Infrastructure Developer Pvt. Ltd.
- Ship navigation training/seminar for marine pilots for Adani Hazira Port Pvt. Ltd.
- Navigation simulation study for Kattupalli Port Expansion, Marine Infrastructure Developer Pvt. Ltd.
- Ship Simulation and mooring analysis study for Azhikkal Port project, HOWE Engineering Projects India Pvt. Ltd.

Logistics and Business Consultancy

- Market study and traffic forecast for Shallow Water Berth and Coastal Berth facilities at Nhava Sheva, Jawaharlal Nehru Port
- Market study and traffic forecast for West Quay-6 facility at Vishakhapatnam Port, Vishakhapatnam Port Authority
- Traffic study and growth potential for cargo flow on Silk Route (China/Central Asia/Iran/ Europe), DP World Pvt. Ltd.
- Market study and traffic forecast for LNG traffic volumes for upcoming FSRU based LNG facility in Mumbai Harbour, S.P. Armada Clean Energy Ventures Pvt. Ltd.
- Traffic Study for Haldia Dock- II (North) at Shalukkhali, Concast Hyundai Haldia Port Pvt. Ltd.
- Demand assessment for LPG import terminal at Kakinada, Bothra Group
- Market potential and demand assessment for port at Karaikal, ICICI Bank

Project Management Consultancy

- PMC for Marine facilities at Dhamra LNG Terminal, Dhamra LNG Terminal Pvt. Ltd.
- PMC for berth and yard facilities, Nhava Sheva (India) Gateway Terminal Pvt. Ltd. PMC for offshore container terminal at Mumbai Port, Indira Container Terminal Pvt. Ltd.
- Construction supervision of Gujarat Pipavav Port Limited, Expansion Project, Gujarat Pipavav Port Ltd.
- PMC for Civil and associated M&E Works of Kattupalli Port, Adani Kattupalli Port Pvt. Ltd.

Coastal environmental modelling

- Marine modelling studies for Paradip Port, HOWE Engineering Pvt. Ltd.
- Oil spill modelling and contingency plan for Gopalpur port, Gopalpur Port Limited
- Cofferdam design, siltation modelling and scour protection design for gas export pipeline at Godavari river, McDermott International
- Hydrodynamic and morphological model studies for Guwahati Gateway Terminal, L&T Geostructures
- Mathematical model study for morphological impacts due to dredging work at Naval Dockyard at Mumbai, Shrikhande Consultants Pvt. Ltd.
- Mathematical Modelling for proposed transshipment site in KoPT limits, WAPCOS
- Marine modelling studies for Petroleum Terminal at Albion, Joint Working Group (STC Mauritius)



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