



14800 St. Mary's Lane, Suite 270
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ZENTECH SCOPE OF SERVICES

Zentech Inc. provides multi-discipline design and engineering for different type of vessels, topsides/ process facilities/modules

Facilities Catered to:

- ◆ Fixed Platforms
- ◆ Jackups, Semisubmersibles, Drillships, OSVs
- ◆ Jackets
- ◆ FPSOs / FSOs
- ◆ MOPUs
- ◆ LNG Terminals
- ◆ FSRUs
- ◆ Floating Power Generation
- ◆ Process Modules
- ◆ Renewable Energy
- ◆ Green Hydrogen / Methanol

Zentech Inc. does design and engineering for both green field & brown field projects

Types of services:

- ◆ Front End Engineering & Design (FEED)
- ◆ Basic & Detailed Design
- ◆ As-Built
- ◆ Review Engineering
- ◆ Adequacy Checking
- ◆ Concept Screening
- ◆ Project Management
- ◆ Construction Support
- ◆ Commissioning Support



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Scope of Services Provided by Zentech

Project Management, Construction and Commissioning Services; including but not limited to:

- ◆ Project Management in Offices, Fabrication Facilities, Shipyards and Onboard
- ◆ Procurement: Interaction with Vendors, Writing Requisitions (MRs) or Data Sheets, Technically Choosing the Equipment, Negotiating and Buying Equipment, Attending FATs, etc.
- ◆ Method Statement, Construction and Upgrade Procedures
- ◆ Construction Management in Fabrication Facilities, Shipyards and Onboard
- ◆ Interaction with Class, Shipyard, Flag State
- ◆ Reactivation and Commissioning

Production and Production Support Related Services; including but not limited to:

- ◆ MODU – MOPU Conversions
- ◆ FSO Conversions
- ◆ FPSO Conversions
- ◆ Well Intervention Barges – Construction, Modifications and Upgrades
- ◆ Crane Barge Conversions and Upgrades
- ◆ Pipe-lay Barge Conversions and Upgrades
- ◆ Decommissioning and P&A Vessel Solutions

Structural Engineering and Analysis; including but not limited to:

- ◆ Pre-FEED and FEED
- ◆ Detailed Design
- ◆ Design, modeling and analysis- Offshore Structures / Floater Modules
- ◆ Structural Analysis (Tool: SACS)
 - In-place
 - Damage
 - Transportation
 - Lift
 - Fatigue
- ◆ Linear and nonlinear structural analysis of Floating bodies for gravity loads, wind, wave and current
- ◆ Frequency domain dynamic analysis for machine vibrations and response to earthquakes, waves, etc.



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- ◆ Time domain dynamic analysis for blasts with or without temperature loads, pressure loads, seismic motions, machine vibrations.
- ◆ Nonlinear analysis including material plasticity, buckling etc. for structures and mechanical components such as pinions, locking system of a jack-up.
- ◆ Finite element analysis for Stress Concentration Factors, plated structures, and solid bodies.
- ◆ Fatigue analysis for welded joints including dynamic effects due to waves, wind, and other time varying loads such as during transportation.
- ◆ Strength and Fatigue analysis for components such as mooring ropes, chains, crane pedestals and other components on ships.
- ◆ Crack propagation analysis due to general loading and fatigue loading for components with defects in material experienced either through inclusions, material imperfections or existing minute cracks.
- ◆ Reliability analysis for Reserve Strength Ratio (RSR) and Risk Based Inspection (RBI) Planning.
- ◆ Local Analysis (Tool: FEMAP)
- ◆ Design of modular structures, integrated units, multilevel units
- ◆ Structural Drafting (Tools: BOCAD, TEKLA)
- ◆ 3D Modeling (E3D, SP3D)
- ◆ Bill of Quantities and material specifications
- ◆ Local and Global strength analysis
- ◆ Forensic Analysis: Post Failure
- ◆ Full Global Analysis
- ◆ Redundancy Analysis
- ◆ Site-Specific Analysis
- ◆ Punch –Through Analysis
- ◆ Hull and Scantlings Design
- ◆ Cantilever, Substructure, Drill Floor, Derrick: Engineering, Modifications and Upgrades
- ◆ Crane, Thruster and Other Equipment Foundations: Engineering and Design
- ◆ Collision Analysis
- ◆ Corrosion Analysis
- ◆ Wet and Dry Tow Analyses and Procedures
- ◆ Earthquake Analysis
- ◆ Blast Analysis
- ◆ Risers (Rigid and Flexible) Analysis
- ◆ Subsea Pipelines



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Naval Architecture and Marine Engineering Services; including but not limited to:

- ◆ Pre-FEED and FEED
- ◆ Detailed Design
- ◆ Intact and Damage Stability analysis of floating bodies
- ◆ Motion response analysis of floating bodies
- ◆ CFD analysis for resistance, and other flow problems.
- ◆ Analysis of "sloshing" effects
- ◆ Analysis of "slamming" effects
- ◆ Longitudinal strength analysis
- ◆ Modification of the Ship structure for additional POB, Helideck, Lifeboat addition or systems' modification both mechanical and electrical engineering related
- ◆ Life Enhancement of vessels through ZAIMS service, identification of components that need to be replaced.
- ◆ Actual performance of Deadweight surveys and inclining experiments
- ◆ Preparation of Inclining Experiments and actual performance of it
- ◆ Establishing a new Load line for modified vessels
- ◆ Shipyard construction support
- ◆ Commissioning procedures
- ◆ Operations Manuals
- ◆ On-board operations' software for loading and stability of floating bodies
- ◆ Mooring advisory with mathematical means and real time equipment performance
- ◆ Vessel salvage studies
- ◆ Mooring Analysis (Static, Quasi-static, Dynamic and Fatigue)
- ◆ Tonnage and Freeboard Calculation
- ◆ Load Line Calculations
- ◆ Displacement and Payload Upgrades
- ◆ Jacket Transportation and Load Out
- ◆ Dynamic Positioning (DP) Analysis
- ◆ Loading Conditions and Preload/Ballasting Procedures
- ◆ In person attendance offshore for offshore vessel moves

Mechanical Engineering Services; including but not limited to:

- ◆ Pre-FEED and FEED
- ◆ Detailed Design
- ◆ P&IDs
- ◆ Isometrics



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- ◆ Piping General Arrangements
- ◆ Complete 3D Modeling
- ◆ Piping Systems up to 15,000 psi
- ◆ Firefighting System
- ◆ System Steam Balance Calculations
- ◆ Riser Tensioners Upgrade
- ◆ Skidding Systems Design and Modifications
- ◆ Mechanical Locking Systems
- ◆ Calculation for Noise and Vibration
- ◆ HVAC System for Gulf and Artic Conditions
- ◆ Equipment Data Sheets and Specifications
- ◆ Steady State and Transient Hydraulic Studies
- ◆ Piping Stress analysis
- ◆ Design of specific customized mechanical components
- ◆ Predictive Maintenance Services using proprietary usage intensity algorithms including provision of sensors and monitoring.
- ◆ Preparation of Data Sheets, Specifications and Selection Rotating Equipment:
 - Centrifugal Gas Compressors
 - Blowers
 - Centrifugal Pumps (API)
 - Gas Turbine Generators
- ◆ Static Equipment:
 - Vessels
 - Exchangers
 - Packaged Units
- ◆ Review of Vendor Documents
- ◆ Procurement Support
- ◆ Factory Acceptance / Site Acceptance

Electrical Engineering Services; including but not limited to:

- ◆ Pre-FEED and FEED
- ◆ Detailed Design
- ◆ Low and medium voltage power system design: concept, basic and detailed for O&G, energy, utility and industrial applications, both onshore and offshore.
- ◆ Electrical troubleshooting, fault diagnostics, root cause analysis, phenomena simulation, and customized studies.
- ◆ System analysis: power flow, short circuit, protection coordination, harmonics, motor starting, and arc flash.
- ◆ Analysis and design of energy storage systems and power electronics.
- ◆ Design/upgrade of safety systems: fire & gas, emergency shutdown, public addresser, general alarm, telecom, SIS



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- ◆ Dynamic positioning system design.
- ◆ Instrumentation, control and navigation system design and improvement.
- ◆ As-built packages: existing system surveys and drawings update
- ◆ Hazardous area assessment and update.
- ◆ Intelligent Survey – Termination Healthy Status (infrared survey)
- ◆ Predictive Maintenance Services using proprietary usage intensity algorithms including provision of sensors and monitoring.
- ◆ Power System Studies (Tool: ETAP)
 - Load Flow
 - Short Circuit
 - Motor Starting etc.
- ◆ Electrical Power Generation and System Design
- ◆ Single Line Diagrams (SLDs)
- ◆ Protection Relay Coordination
- ◆ Cable Routing Design, Layouts and Material Take-Off
- ◆ Lighting System Design, Layouts and Material Take-Off
- ◆ Earthing System Design, Layouts and Material Take-Off
- ◆ Electrical Terminal Connection Diagram
- ◆ Preparation of Electrical Equipment Data Sheets and Specifications
- ◆ Review of Offers and Vendor Drawing

Instrumentation Engineering Services; including but not limited to:

- ◆ Instrumentation Design Basis
- ◆ Control Philosophy and Specifications
- ◆ Detailed Engineering and Specifications for:
 - Distributed Control Systems
 - Programmable Logic Controllers
 - Emergency Shut Down Systems
- ◆ Fire and Gas Detection System
- ◆ Philosophy and Specification
- ◆ Sizing of Control Valves, Flow Elements, Safety Valves, etc.
- ◆ Instrument Indexing
- ◆ Data Sheets/Specifications for Instruments, Control Valves, Safety Valves
- ◆ Instrument Bulk Material Take-off
- ◆ Cable Selection and Scheduling
- ◆ Control Room Design including Panel, Console Layouts
- ◆ Cable Tray Layout and Conduit Routing



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- ◆ Instrument Installation Hook-ups
- ◆ Instrument Loop Diagrams
- ◆ Review of Vendor Drawings and Documents
- ◆ Technical Bid Evaluation for Instruments, Valve

Process Engineering Services; including but not limited to:

- ◆ Process Simulation & Process Optimization (Tool: HYSYS)
- ◆ Expertise in Dynamic Simulation for transient behavior studies
- ◆ Flow Sheet development with Heat and Material balances
- ◆ Preparation of PFD and P&ID
- ◆ Specifications for Process Equipment and Instruments
- ◆ Line Sizing, Equipment Sizing
- ◆ Basic Engineering Package for Process Units, Utilities
- ◆ Conceptual Top-side Layout
- ◆ Process Control Philosophy
- ◆ Process Shutdown Philosophy (Normal & Emergency)
- ◆ Cause and Effect Diagram
- ◆ HAZOP Studies
- ◆ Flare network analysis (Tool: FLARENET)
- ◆ Hydraulic calculation (Tool: PIPENET)
- ◆ Heat Exchanger design (Tool: HTRI)
- ◆ Blow down study (Tool: HYSYS Depressurization)

Process Safety

- ◆ Risk:
 - Qualitative Risk Assessments
 - Quantitative Risk Assessments
 - Risk/Opportunity Workshop Facilitation
 - Functional Safety Assessments
 - Technical Integrity management
 - Process Safety Management
 - ALARP Demonstration



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- ◆ Technical Safety:
 - Safety Cases
 - Emergency Response Planning
 - HAZID/HAZOP Facilitation
 - Layout Reviews
 - Safety Critical Elements

- ◆ Identification
 - Fire Safety Studies
 - Reliability/Availability Modeling
 - Major Hazard Areas

General Arrangement and Layout Studies; including but not limited to:

- ◆ General Arrangement and Equipment Layout
- ◆ Fire Safety and Prevention Plan
- ◆ Escape Routes and Hazardous Area Plan
- ◆ Watertight Integrity and Structural Fire Protection Plan
- ◆ Crane Radius and Material Handling Studies
- ◆ Detailed Layout for Overall Topsides / Process Plant
- ◆ 3D MODELING (Tools: E3D / SP3D)
- ◆ Equipment Layout Drawings
- ◆ Piping Materials
- ◆ Specifications
- ◆ Specifications for Specialty Items
- ◆ Piping General Arrangement
- ◆ Piping Isometrics
- ◆ Pipe Stress Analysis (CAESAR II)
- ◆ Pipe Support Design
- ◆ Material Take Off

Software Enabled Services

- ◆ Asset Integrity Management Solution for Fixed and Floating Structures including Commercial and Military Ships.(ZAIMS)
- ◆ Vessel Management Solutions (ZAIMS for Vessels)



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- ◆ Load and Stability Management (LosJack, LoSemi, LoShip)
- ◆ Weight Management Solutions (WMS)
- ◆ Mooring Advisory Software (ZenMas/ ZenMap)
- ◆ Mooring Analysis Software (ZenMoore)
- ◆ 3-D Crack Propagation Prediction (ZenCrack)
- ◆ Wave Radiation Diffraction Program for Floating Bodies (Neptune)
- ◆ Zentech Watch Circle Program for Drillships- Mathematical Modelling (Z-Watch Circle)

New Build Vessel Designs

- ◆ Jack-ups (R-450D, R-550-D, Z-636)
- ◆ Semisubmersibles (Eva-Plus)
- ◆ Jackup-Semi Hybrids for Polar Waters
- ◆ Multipurpose Service Vessels (MPSVs) (Z-210)
- ◆ Multipurpose service vessels for disassembly, transport and reassembly for areas such as Caspian Sea (Z-210 – CS)
- ◆ Self-Erecting Platform Rigs
- ◆ Jack-up vessels for Wind Farm Installation
- ◆ Swath vessels for Wind Farm Maintenance
- ◆ Vessels for Gathering Plastics in the Ocean
- ◆ Offshore Liquid Mud Plant Vessel (LMPV)

Specialty Services - SIGNAGE

- ◆ Signage surveys with detailed GAP ANALYSIS.
- ◆ All signs can be customized as per client's requirement.
- ◆ Shall be installed with our rope access team - faster and cost effective (can avoid scaffolding)
 - a. International safety-Mandatory, Prohibition and warning signs
 - b. Valve and equipment tags
 - c. IMO signs – Life saving and fire fighting
 - d. Pipe markings color coded for Oil/Water/Brine etc
 - e. Operational Boards
 - f. Right to know signs
 - g. Other specific customer needs
- ◆ Multilingual Signage for wide temperature range, -40 deg-250 deg F
- ◆ 5 Year Replacement Warranty on Signage

Specialty Equipment

- ◆ Locking Device for Jack up Legs (Zen-Lock)



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- ◆ Catching Dropped Objects (Zee-Sock)
- ◆ Jetting System
- ◆ Load Monitoring Devices for Offshore Jackups and Fixed Platforms

ZXR: Virtual Capture Modeling

a. ZXR – Marketing (ZXR-M)

- ◆ Detailed Photo Realistic Walk-Thru with Model/Dollhouse
- ◆ "Tagging" areas with media attachments (PDF, JPG, Videos, etc.)
- ◆ Facilitate exploring onboard
- ◆ Eliminate traveling to offshore assets
- ◆ Cross-collaboration with Clients
- ◆ Photorealistic - HD Quality; 'final product' marketability
 - 4K quality 2D images
 - 360 photos

b. ZXR – Engineering (ZXR-E)

- ◆ Point Cloud Data: A set of data points in space. Each point has its set of X, Y, and Z coordinates
- ◆ Data capture (even in no lighting environments) within +/- 1-2mm accuracy
- ◆ Ability to accurately create, modify or compare 2D drawings and 3D
- ◆ Maximizes integration to review onboard state with design and engineering teams by exploring spaces in a 360 environment from their own computers.

c. ZXR – Inspection (ZXR-I)

- ◆ STOP THE NEED OF PERSONNEL ENTERING TANKS FOR INSPECTIONS – Saving time, money, and reducing risk of personnel.
- ◆ Collaborative viewing
- ◆ Improved Structural Integrity thru higher quality inspection planning
- ◆ Data capture (even in no lighting environments) with onboard lighting system
- ◆ 3D Modeling with onboard LIDAR

Green House Gas (GHG) Services

- ◆ Carbon Footprint Accounting System (Z02), as per EPA and GHG Protocol
- ◆ Assessment and improvement of energy systems for carbon reduction
- ◆ Carbon footprint and lifecycle assessments (LCA)
- ◆ Green Hydrogen /Methanol: EPIC of Modular Plants. (In partnership with Splitwaters)



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Preventive & Predictive Maintenance Services (PMS)

a. Vibration Monitoring and noise Analysis

- ◆ **Predictability:** Enables maintenance staff to schedule repairs and procure necessary parts in advance.
- ◆ **Safety:** identifies and rectifies faults; thus, preventing potential hazards.
- ◆ **Preserve the equipment:** By minimizing unexpected failures, vibration monitoring helps in avoiding production halts.
- ◆ **Optimize Maintenance:** Extends the lifespan of equipment and aligns maintenance schedules more closely with actual needs.
- ◆ **Reliability:** Anticipates problems before they occur, enhancing the overall reliability of machinery and instilling confidence in maintenance schedules and budgeting.

b. Thermography

- ◆ Condition assessment of equipment
- ◆ Early detection of defects and predicting breakdowns and their severity
- ◆ Life extension of equipment
- ◆ Customized PMS development
- ◆ Conducting live surveys and hence no production losses

c. Ex survey

- ◆ Conduct a review of the facility and provide condition of asset
- ◆ Gap Analysis
- ◆ Hazardous area inspection and verification to check the products in Hazardous area for compliance with the requirements directives and Hazardous Zone
- ◆ Technical support, Ex design, drawings, check list, manuals and risk assessment
- ◆ Documentation- Inspection report, Ex register and certificate verification

Proven Sensor Technology (Realtime Integrity Monitoring of Structures and Foundation)

- ◆ The proven sensor technology provides the rig owners added confidence in their fleet for safe and secure operations by monitoring real-time load transfer to the foundations.
- ◆ The current mathematical means of load calculations provide unsubstantiated results.
- ◆ The sensors can be mounted on the Legs, Spud Cans, or the Superstructures of existing or new Jack-up drilling rigs. The provision and location of sensors on any structure can be tailored as per customer needs.