

Yong Bai

Ph.D. P.E

Yong Bai
President & Principal Consultant
Offshore Pipelines & Risers (OPR) Inc.
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QUALIFICATIONS:

1. 20 years of experience in engineering analysis, design, testing, procurement and construction with focus on subsea pipelines, risers, semi-sub drilling rigs and jack-up rigs.
2. Leadership and technical management skills; good communication and presentation skills. Had been a department manager at JP Kenny A/S for 4 years, at ABS for 2 years and MCS for 2 years & president of engineering firms for 2 years.
3. Insight knowledge and experience on subsea pipelines & risers, drilling rigs and well systems as well as related design rules, codes, standards, specifications, recommended practices, e.g. ABS, API, ASME, BS, DNV, ISO, NPD, etc.
4. Skilful computer literacy. Proficient in ABAQUS, ANSYS, STRUREL, SESAM, etc.

Dr. Bai is the author of three books "Pipelines and Risers", "Marine Structural Design", "Subsea Pipelines and Risers" and "Subsea Engineering Handbook" published by Elsevier Science in 2001, 2003, 2005 and 2010 respectively. In March 2000, he was given the best paper award by ASME/OMAE conference held in New Orleans.

ACADEMIC ACHIEVEMENT

Professor (Zhejiang University, Offshore Structures, 2010-Now)
Professor (Harbin Engineering University, Offshore Structures, 2005-Now)
Researcher (Univ. of California at Berkeley, 1994)
Ph.D. (Hiroshima Univ., 1989, Offshore Structures)
M.Sc. (Hiroshima Univ., 1986, Naval Architecture)
Graduate student (Shanghai Jiao Tong Univ., 1982)
B. Sc. (Harbin Eng. Univ., 1982, Naval Architecture)

PROFESSIONAL EXPERIENCE

OPR Inc., President (May 2005 -)

As President, Dr. Bai has an overall responsibility as project manager and principal consultant responsible for projects related to design, installation and integrity management of steel catenary risers (SCR), hybrid risers, top tensioned risers (TTR), flexible pipes, umbilicals and drilling risers as well as subsea pipelines, subsea manifolds and jumpers and structural design of semi-sub drilling rigs, pipelay barges and other floating systems.

May 2007 – Present, Principal Consultants for BOMCO – A Major Chinese Drilling Equipment Company: Responsible for teaching marine (subsea) drilling equipment staff and performed study projects as consulting projects of OPR Inc

- Mechanical Design of Drilling Risers

May 2007 – Present, Principal Consultants for China Petroleum Pipeline Offshore Engineering (CPP OE): Responsible for teaching marine (subsea) pipeline engineering staff and performed study projects as consulting projects of OPR Inc

- Pipelay Vessel Design and Equipment Selection

Nov. 2006 – Present, Principal Consultants for Petronas – Malaysian National Oil Company: Responsible for teaching and evaluation of pipeline and riser staff and performed study projects as consulting projects of OPR Inc

- Remaining Strength of Corroded and Dented Pipe
- Fitness for Services Assessment (FFS) of Pipelines and Risers

March 2007 – Present, Project Associates Inc (PAI) Chevron Piceance Onshore Pipeline Design: Responsible for basic design and analysis of the gas lines and liquid lines, including.

- General Field Layout
- Wall-thickness Sizing & Material Selection
- Corrosion Allowance Design
- Stress Analysis
- Hydraulic Analysis
- Flow Assurance Analysis
- CP and Coating Design

From May 2005 to April 2006, my project experience as GAE Inc president includes:

- BP Mad Dog Drilling Riser Integrity Assurance Study
- TORP China Business Feasibility Study
- GG Manifold Design and Fabrication Standardization
- Bergesen FPSO Topside Corrosion Study
- Technip Kikeh Riser Verification
- HiWay Offshore Personnel Transfer Study
- FredOlsen Blackford Dolphin Mooring Study
- Glomar Explorer Drilling Riser Study

Yong Bai

Ph.D. P.E

- Chevron Agbami FPSO Topside Study
- SBM Kikeh Offshore Transfer Line Verification
- DeepDrill 7500 Design and Fabrication Support
- FredOlsen Piping Design Pressure Calc.
- Grenland Minox Sales and Marketing
- BP XHPHT High Strength Riser Qualification
- Atlantia Thunder Hawk SCR Riser Design
- Petronas Riser and Pipeline Workshop

MCS Inc. VP Engineering (April 2003 – June 2005)

As Vice President of Engineering, Dr. Bai has had wide experience as project manager and senior consultant responsible for projects related to design, installation and integrity management of steel catenary riser (SCR), hybrid risers, top tensioned risers (TTR), flexible pipe, umbilical and drilling risers as well as subsea pipelines, subsea structures and structural design of floating systems. *Selected projects are presented below.*

RISER FEED ENGINEERING:

- Kizomba B Field - FEED Study
 - Lead Riser and Pipeline Engineer responsible for system design options screening study, cost comparisons and ITT package preparation.
 - Estimated procurement and installation cost, based on system selection, preliminary design, compatibility with field layout, previous use history and flow assurance requirement.
 - Designed buoyancy module, suction piles and hybrid riser systems.
 - Performed preliminary strength, wave and VIV fatigue analysis to confirm technical feasibility and to provide interface loads at topsides and subsea.

Client: EMDC

- Bonga Southwest Field – FEED Study
 - Lead riser engineer at Shell who developed ITT packages for riser design and construction. Scope of Work includes a full set of riser design and installation studies on SCRs, flexible risers and hybrid risers and coordination of studies by engineering consultants.
 - Conducted cost estimates and comparisons for alternative design concepts such as SCR, flexible risers and hybrid risers.
 - Prepared a full package of the riser specifications, including specifications for linepipe, corrosion protection coating, anodes, insulation coating, VIV suppression devices, etc.
 - Responsible for interfaces with topside engineering, flow assurance engineering, hull and subsea pipeline engineering.

Client: Shell

- XHPHT SCR for GoM Fields
 - Project manager for BP's technology project that explores

- challenges and solutions for SCR operated at design pressure of 20 ksi and temperature of 350 K (178 C)
 - Developed design concepts for full titanium riser scenario and threaded & coupled riser scenario.
 - Conducted preliminary riser designs and strength/fatigue analyses for these two design scenarios.
 - Assessed challenges and solutions for linepipe and coating materials and various components such as stressjoints and flexjoints.
 - Evaluated installation options and vessel availability.
 - Estimated total costs for alternative design and installation scenarios.

Client: BP

- Agbami Field
 - Project manager for comparative risk study of flexible risers, steel catenary risers and hybrid risers.
 - Presented pros and cons for alternative design concepts.
 - Developed presentation materials for ChevronTexaco to convince the Nigeria authority that flexible risers are the preferred and safe solution.
 - Developed risk assessment and integrity management strategy for possible inclusion into ITT bid packages.

Client: ChevronTexaco

- Glider Umbilical
 - Lead riser engineer responsible for steel tube umbilical part of the FEED study.
 - Evaluated design concepts from 4 competing bidders for steel tube umbilical including tube sizing and cross-section design.
 - Conducted preliminary riser strength/fatigue analyses and interference analysis.
 - Evaluated EPIC bid packages from perspective suppliers including the assessment of design, installation, cost estimate and safety/quality considerations.

Client: Shell

- Ursa-Princes Water Injection SCR
 - Lead riser engineer responsible for conceptual design and cost estimates
 - Conducted preliminary design and analysis.
 - Evaluated installation options and costs

Client: Shell

- Dorado Tie-back to Marlin TLP
 - Project manager for steel tube umbilical part of the FEED study.

Yong Bai

Ph.D. P.E

- Developed design concepts for steel tube umbilical including tube sizing and cross-section design.
- Conducted preliminary riser strength/fatigue analyses and interference analysis.
- Provided interfaces loads and host layout design for interfaces with topside and hull disciplines.

Client: BP

- Ranggas Field

- Project manager for conceptual design of Top Tensioned Risers.
- Developed design concepts for the TTR riser systems.
- Selected stack-up models.
- Conducted static/dynamic riser strength analysis
- Conducted VIV and wave fatigue analyses
- Conducted interference analysis.
- Evaluated design stress concentration factors.
- Conducted benchmark study with other Unocal TTR risers

Client: Unocal

- Atwater Valley Producers (AVP)

- Senior Consultant for design of steel catenary risers and umbilical risers.
- Developed design concepts for steel catenary risers and steel tube umbilical including sizing and cross-section design.
- Conducted preliminary riser strength/fatigue analyses and interference analysis.
- Verified conceptual riser designs by two deep-draft vessel contractors and the same for a spar scenario.
- Wrote a technology report addressing challenges and solutions for deepwater high pressure SCR attached to high motion floaters.

Client: Multiple clients

RISER DETAILED ENGINEERING:

STEEL RISERS (SCR, TTR, Drilling)

Design

- Front Runner Field

- Project manager for fatigue analysis and design part of the steel catenary riser project.
- Estimated fatigue damages due to wave actions, VIV and vortex-induced spar motions.
- Provided fatigue stress histograms for Engineering Criticality Assessment.

Client: Murphy

- Atlantis Drilling Risers

- Project manager for GlobalSantaFe Development Driller II drilling riser design and analysis, fatigue and seal wear qualification tests, design and specification review and VIV monitoring as well as management of sub-contractors work.
- Evaluated 3 alternative stack-up models based on re-coil

analysis, deployment analysis and operability analysis.

- Riser analysis includes a full package of drilling riser analysis including re-coil, operability, running and retrieval, drift-off, hard/soft hang-off, weak point analysis, wave and VIV fatigue analysis.
- Fatigue and seal wear tests include preparation of specifications for various tests being conducted at Stress Engineering Services, KOP and Edison Welding Institute.
- Design and installation specifications review includes evaluation of various load-carrying components.
- VIV instrumentation system engineering including VIV analysis and layout of VIV and current data monitoring systems.
- Conducted Engineering Criticality Assessment for determination of weld inspection defect acceptance criteria.
- Management and coordination of the work by sub-contractors (SES, KOP, EWI).

Client: BP

Verification

- Red Hawk Field

- Project manager for verification of steel catenary riser system connected to cell spar in 5,200ft of water.
- Verified strength, wave and VIV fatigue design of the SCR conducted by Technip, Atlantia and AkerKvaerner.
- Checked interference and riser host layout.
- Verified strength and fatigue of pull-tubes.
- Reviewed design specifications submitted by the EPIC Contractor.
- Evaluate deepwater vessel installation capacities.
- Studied SCR transfer to host vessel.
- Conducted preliminary installation analysis.

Client: KerrMcGee

- Ocean Confidence Drilling Risers

- Project manager for this drilling riser project.
- Built a finite element model of the drilling riser consisting of BOP/LMRP, lower flex joint, riser adapter, termination spool, slick joints, 6.6k, 5k, 3k and 2k buoyed joints, fill valve, slip joint.
- Performed buckling analysis of the landing string. The analyses are performed to obtain buckled shape of the string (3 different mode buckled shapes are considered for the current study).
- Performed a parametric study of the drilling riser for the lateral loads imposed by the buckled string in each of the modes shapes. The lower flex joint

Yong Bai

Ph.D. P.E

angles Vs the top tension are parameters of interest in the current study.

Client: Diamond Offshore Drilling

- Validation of Open Water Tree Tubing Design
- Project manager for this drilling riser project.
- Build a finite element model of the drilling riser
- Document review of analysis method.
- Document review of dynamic and fatigue analysis.
- Independent analysis of critical cases.
- Preparation of validation report.

Client: Woodside

Installation

- Red Hawk Field
- Project manager for verification of steel catenary riser system installation.
- Performed independent installation analysis.
- Verified installation engineering reports.

Client: KerrMcGee

- BP XHPHT SCR
- Project manager for installation engineering work.
- Reviewed deepwater installation vessel capacities and recent projects.
- Assessed riser welding installation prior to host arrival.
- Studied SCR transfer to production host.
- Conducted installation analysis.

Client: BP

Integrity Management

- SCR Integrity Management JIP.
- Develop a methodology for the integrity management of SCR systems.
- Identify and describe current best technology in terms of Inspection and Monitoring Methods.
- Provide a framework and web-based software for structured record-keeping to allow periodic demonstration of fitness for purpose and/or to justify extension of service life.
- Identify emerging technologies and technology gaps relating to for SCR inspection and monitoring.
- Develop an approach for validation of design methods and key design assumptions.
- Provide a forum among JIP participants for sharing experiences in SCR integrity technology.
- Publish industry guidelines on SCR integrity management, possibly as input to an API or ISO.

Client: Multiple Clients

FLEXIBLE RISERS

Verification

- Pierce Water Injection, UK
- Lead engineer for verification of on-bottom stability and upheaval buckling of the flexible flowlines.

Client: Shell

Integrity Management

- Agbami Field
- Consultant for integrity management of flexible risers for Agbami field development.
- Assessed risks for flexible risers.
- Identified integrity management strategy.

Client: ChevronTexaco

STEEL TUBE UMBILICALS

Design

- Red Hawk Field
- Senior Consultant for analysis of the umbilical design conducted by DUCO.
- Conducted strength, fatigue and interference analysis.
- Designed bend stiffeners.

Client: Duco

Shell Int. E&P INC.

Staff Civil Engineer (March 2002 – April 2003)

Bonga Southwest Project ITT Package Preparation

(March – Dec. 2002): As Lead Riser Engineer, responsible for preparation of the ITT packages for design and installation of the following risers:

- Flowline risers and gas export risers
- Gas-lift risers and umbilicals
- Oil offloading risers

Scope of work includes system selection, field layout, conceptual design, wall-thickness & coating selection, flex/stress joint design, interference analysis, strength and wave fatigue analyses, VIV fatigue analysis, specification updating and project coordination.

FPSO Design and Concept Selection (June 2002 -

Dec. 2002): Participating in the development of new design concepts and contracting strategy for FPSO.

Wave-Induced and VIV Fatigue Analysis of Bijupira-Salema Drilling and Completion Risers

(Nov. - Dec. 2002): Responsible for analysing wave/VIV fatigue and recommending operating manual.

UPWF (Ursa-Princess Water Flooding) SCR Riser Design and Construction (Jan.-April 2003):

Responsible for design and analysis of the SCR riser.

Glider Umbilical Design and Analysis (Jan.-March '03): Responsible for design & analysis of umbilical.

KIZOMBA B FEED STUDY (Dec. 2001 - March,

2002). Lead Riser and Flowline Engineer at Doris. Responsible for the mechanical design of flowlines, single hybrid risers and bundled hybrid risers.

Yong Bai

Ph.D. P.E

AMERICAN BUREAU OF SHIPPING,

Manager - Offshore Technology Dept. (Dec. 99 - Dec. 2001)

Leading and participating in various projects as summarised below:

(1) Subsea Pipelines and Risers Guide

In March 2001 this project published an ABS Guide for Building and Classing Subsea Pipelines and Risers. The Guide is consistent with API 1111, ASME B31 Codes, and API RP 2RD. The Guide also provides guidance on limit-state design, risk and reliability analysis and assessment of dent and corrosion defects.

(2) Spar, TLP and FPSO Guides

The project updated a Guide for Building and Classing Floating Production Installations. The primary tasks are the development of design criteria for TLPs, Spars and ship-shaped FPSO. Criteria have been developed on longitudinal strength, stability, structural arrangement, structural design of hulls, strength and fatigue analysis of hull structures and marine systems such as piping, electrical systems, fire fighting systems and machinery equipment.

(3) Buckling and Ultimate Strength Guide and Software

The project developed a complete guideline and software for the buckling and ultimate strength assessment of offshore structures. It covers all major structural components, such as tubular members, plates and stiffened panels, stiffened shells, tubular joints and pressurised pipes.

(4) Fatigue Guide and Spectral Fatigue Program

The project developed guidance notes and software for the fatigue and fracture assessment of offshore structures. The guidance notes include detailed procedures for fatigue and fracture assessment and guidance on the selection of S-N curves, thickness effects and stress concentration factors.

(5) Jack-up Dynamics and MODU Rules

The project began with a study on dynamic response of jack-ups and the effect of structure-foundation interaction, and concluded with MODU Rule changes, Commentary on jack-up structures and Guidance Notes on jack-up dynamics.

(6) Coupled Analysis of Hull/Riser/Mooring Systems

The project developed an analysis tool for coupled analysis of hull/riser/mooring lines. The tool is very useful for design and analysis of deepwater floating structures such as spars, TLP and FPSO.

(7) Offshore Risk and Reliability

The project developed procedures and requirements for risk assessment of offshore structures, including: risk-based

classification, risk-based inspection (RBI), risk-based survey, risk-based integrity management and time-variant reliability of FPSO structures, pipelines, mooring and riser systems.

STAVANGER UNIVERSITY COLLEGE (His)
(Sept. 96 – Dec. 2000)

Professor of Offshore Structures,

Responsible for the M.Sc and Ph.D programs and research in the offshore structures group. Taught five graduate (M.Sc and Ph.D.) courses:

- Finite Element Analysis
- Pipelines and Risers
- Marine Structural Design
- Offshore Risk and Reliability Methods
- Limit State Design of Offshore Structures

Supervised thesis projects of two Ph.D. students and more than 20 M.Sc students.

J P KENNY A/S (Mar. 96 - Dec. 1999)

Manager of Advanced Engineering Dept.

Åsgard Flowlines - Concept Design & Detailed Design, for Statoil and Saga Petroleum (March 96 - Dec. 1999). Deputy Project Manager and Engineering Manager.

Leading and participating in design of 10" HP/HT in-field flowlines such as:

- a) Wall-thickness selection
- b) Strain-based criteria for limit state design
- c) Global upheaval and lateral buckling
- d) Residual strength of corroded pipelines
- e) Installation stingers & engineering
- f) Installation of in-line valves
- g) Strain concentration factor for installation
- h) Installation of pipeline with residual curvature
- i) Uneven seabed and vortex-induced vibration
- j) Risk analysis and safety assessment
- k) On-bottom Stability

Åsgard NHD (Norne-Heidrun-Draugen) Pipelines - Detailed Design of 20" Export Pipeline (Oct. 97 - Dec. 1999).

Leader of Part Project Team, responsibility similar to that on Åsgard Flowlines Project.

Åsgard Transport - Detailed Design of Offshore Pipeline Sections (Jan. 97 - Dec. 1999).

Deputy Engineering Manager. Leading and Participating in design of 42" trunkline of 500 miles, responsibility similar to that on Åsgard Flowlines Project.

GFSAT Flowlines, for Statoil, (Dec. 96 - Dec. 1999).

Yong Bai

Ph.D. P.E

Senior Engineering Specialist and Leader of Part Project Team for a study on ratcheting and low-cycle fatigue of HT/HP pipelines at Gullfaks Satellite Field.

JAPEX Design Method Study - for Japan Petroleum Exploration Co. Ltd. (May 97 - Dec. 1998). Project Manager, Responsible for activities at JPK Norway that are co-ordinated by JPK Malaysia.

DEEPIPE(Nov' 97 - Dec.1999). Project Manager
Responsible for the activities at JPK A/S that are devoted to local/buckling collapse of corroded pipelines under combined loads. The DEEPIPE "Deepwater pipeline design criteria" project is a Joint Industry Project sponsored by multiple oil/gas companies.

EXPIPE (Jan. 98 - Dec. 1999). Project Manager
The EXPIPE project is conducted together with SINTEF and several oil companies for "Application of X80 Linepipe Steel for Export Pipelines".

PEMEX RAM-PIPE (Oct. 98 - Dec. 1999). Working as a member of a team that was led by Prof. Robert Bea. The scope of work is to develop design criteria for design and re-assessment of offshore pipelines.

Riser Design and Analysis (Oct. 98 - Dec. 1999).
Responsible for a project that compares alternative analysis methodologies, tools and criteria for design of steel catenary risers and flexible risers.

42 Inch Pipeline Damage Assessment and Repair Methods (April - May '97). Supporting JPK Sdn Bhd in Kuala Lumpur.

DET NORSKE VERITAS AS (July 92 – Feb. 96)
Senior Engineer and Project Manager for Joint Industry Projects.

- Residual Strength of Corroded and Dented Pipelines, for Statoil, Phillips, Petrobras, NPD, The US Mineral Management Service, The Research Council of Norway and DNV (Aug. 93 - Aug. 95)
- Phillips, Ekofisk IIA, strength and reliability assessment of corroded pipelines, for Phillips (1994)
- Superb: Submarine pipelines reliability based design, for Statoil, Shell, Norsk Agip, Exxon and NPD (1994)
- Strength assessment of dented pipelines, for NPCC Singapore Pte Ltd. (1994)
- Sleipner Vest Rør, buckling and capacity assessment of pipelines, for Statoil (1994)
- Update of DnV 1981 pipeline rules (1994)
- Re-qualification of pipelines, for Norwegian Petroleum Directorate (1993)
- Earthquake response reanalysis of the 16/11 jacket platform,

for Statoil (1993)

- Finite element analysis of pressure vessels, for SB-verksted A.S. (1993)
- Static and fatigue strength analysis of complex tubular joints using SESAM for Elf Petroleum Norge A/S (1993)
- Heidrun - Nonlinear finite element analysis of concrete structures (Tether porch) using SOLVIA (ADINA) systems for Conoco (1993)
- Ship Collision - Analysis of structural response to collision using program SANDY for NTN and Det Norske Veritas Research AS (1993)
- Hibernia - Global finite element analysis using SESAM systems for DORIS Engineering (1992)

UNIVERSITY OF CALIFORNIA AT BERKELEY (Jun. 94 - Sept. 94): Post-doctoral Fellow. Department of Naval Architecture and Offshore Engineering. Research on reliability of ship structures and pipelines.

NORWEGIAN UNIVERSITY OF SCIENCE AND TECHNOLOGY (Aug. 91 - Jun. 92): NTN Post-doctoral Fellow. Division of Marine Structures. Research on pipes used in pipelines, TLP tethers and risers, and ultimate strength and impact behaviour of composite materials used in high speed vessels.

TECHNICAL UNIVERSITY OF DENMARK (Jun. 90 - Jul. 91): Engineer. Department of Ocean Engineering. Research on ship hull strength, ship collision and grounding. Development of the program SANDY (Static and Dynamic Analysis of Nonlinear Structures).

CENTURY RESEARCH CENTER, Osaka (Apr. 89 - Jun. 90): Project Engineer. Technical Department. Extensive engineering analysis for the verification of various design of bridges and buildings. Used several finite element programs such as NASTRAN, ABAQUS, MARC and ANSYS and several company programs (DYNA, FRAME etc.). Main tasks were the preparation of input data for geometry, loading and material and interpretation of the finite element results..

HIROSHIMA UNIVERSITY (Sep. 83 - Mar. 89): Ph. D. student. Department of Naval Architecture & Structural Engineering. Part-time employee of Hiroshima Shipyard of Mitsubishi Heavy Industries. Working experience includes ship design and drawings, construction and interpreter for surveyors and shipyard engineers. Participation of the whole process of design and construction of a ship built for a company in China.