

Marcelo E. Canga, Ph.D.

President

SUMMARY OF QUALIFICATIONS

Experience in design of offshore installation operations including Loadout, Offload, Transportation, Uplifting, Mating, Lowering, Launching and Mooring. Stinger and pipelay analysis. Advanced analytical skills with emphasis on Dynamics, Hydrostatics, Hydrodynamics and Structural analysis. Nonlinear Finite Element analysis. Proven ability to lead a team, to organize, to negotiate and to communicate with peers, committees and governing bodies.

EDUCATION

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|--------------------------|---|
| <i>Dec. 2004</i> | Licensed Professional Engineer
PE License Number 94515, Texas, USA. |
| <i>June 93 - Dec. 97</i> | Ph.D. in Engineering Mechanics. GPA 4.0/4.0.
University of Texas at Austin, USA.
Dissertation topic: "An iterative algorithm for the finite element analysis of near-incompressible materials." |
| <i>Sept. 90 - May 92</i> | ME in Mechanical Engineering. GPA 4.0/4.0.
Carnegie Mellon University, Pittsburgh, Pa, USA.
Major in Solid Mechanics and Vibrations.
Dissertation topic: "Mechanical interactions between continuum bodies in metal forming processes. Constitutive friction laws." |
| <i>Mar. 82 - Oct. 88</i> | MS in Civil Engineering. GPA top 10%.
Universidad de Buenos Aires, Buenos Aires, Argentina.
Major in Structural Mechanics and Structural Design.
Project topics: "Structural design of a concrete pre-stressed highway bridge,"
"Dynamic response of slender structures." |

WORK EXPERIENCE

October 2005 - present

- President
Ultramarine Offshore Consultants, Houston, TX, USA
- ◇ Petrobras
Papaterra Project
Tension Leg Platform (TLP) and topsides installation engineering
Project in progress
- ◇ Woodside
McDermott
Browse Project
P1 floatover 30,000-t deck
QU floatover 22,000-t deck
- ◇ Noble energy.
Tamar project.
10,000-t deck. Loadout and transportation screening
- ◇ Noble energy.
Tamar project
20,000-t jacket. Launch and upend. Marine and structural verification.
- ◇ TPAO. Turkish Oil Company.
Akcakoca project.
Consulting marine services for their first offshore jacket/topside installation
project.
- ◇ Global Industries
G1200 deepwater pipelay vessel
Stinger structural design verification. A-Frame and strong back structural
strength. Pipe tensioner upgrade verification. Hull redesign for new pipe ten-
sioner. ABS rules.
- ◇ Woodside.
Floatover
North Rankin B.
- ◇ Versabar Inc.
Custom Salvage System (bottom feeder)
Performance and strength evaluation of the lifting system for transportation,
stand-by and lifting. Mooring analysis. Model basin supervision in Escondido,
CA. Redesign of barge-gantry connector configuration. Coast Guard approval
process.
- ◇ Total.
Pazflor FPSO.
Fatigue and strength analysis of several structures.
- ◇ ChevronTexaco.
Index Frame, a pipe handling system.
Deployment strength evaluation in deep water.
- ◇ Globalmaritime, Norway
GMlift, Semisubmersible lift vessel.

Performance and strength evaluation of mating system. Hydraulic lift system study. Model test.

- ◇ The Expro Group
Two MOPU (jackup) vessels
Performance and structural strength evaluation. Redesign and reconstruction.
- ◇ Bay engineering.
Great Lakes Single Point Mooring Buoy Mooring coupled to a hooper dredge.
Connection design forces. Motions.
- ◇ Momentum Engineering.
Mooring analysis for the Crane Barge Titan III
- ◇ Chet Morrison Contractors.
Quay side launch of a dry dock.
- ◇ Foxtrot International.
Compressor Module Transportation. Seafastening design.
- ◇ Project Costa Afuera Pemex. Paragon, Bay-Inelectra.
Installation engineering for 2 Living Quarter Decks (4000 ton each), HA-KU-H and HA-ZAAP-C. Loadout and transportation. The scope includes ballasting plans, mooring design, motion analysis, stability analysis and structural analysis of cargo and barges. Lead for the execution of the loadout operations
- ◇ Project Costa Afuera Pemex. Swecomex.
Installation engineering of 16 structures, including jackets, decks and bridges. HA-KU-H and HA-ZAAP-C. Loadout, transportation and lifting. The scope includes ballasting plans, mooring design, motion analysis, stability analysis and structural analysis of cargo and barges. Design of seafastenings, padeyes, rings, etc.
- ◇ ConocoPhillips. SPS.
Performance and strength analysis of a spud barge for oil production in Maracaibo, Venezuela. Motion and mooring analysis. Strength and fatigue analysis of the spuds. Shallow water.
- ◇ Versabar Inc. ChevronTexaco
West Africa Module Installation
Installation of a 2,500 Ton module onto South Nemba fixed platform. Module and Barge dynamic interaction analysis. Tip-hook dynamic force amplification factor. Mooring lines, hawsers, barge supports and rigging design forces.

June 2004 - present

Engineering Consultant

Canga & Associates, Houston, TX, USA

- ◇ Project Costa Afuera Pemex. Installation engineering for 3 jackets and decks, Manik-A, Maloob-A and Maloob-B. Loadout, transportation, flotation and jacket upending. The scope includes ballasting plans, mooring design, motion analysis, stability analysis and structural analysis of cargo and barges. Lead for the execution of the loadout operations
- ◇ Torch Offshore. Alba Field Development. Stationkeeping analysis on the Midnight Brave. Damage and Intact cases.
- ◇ Stolt Offshore. Pipelay Angostura Project. Two body structural analysis of the

46m stinger. Pipelay analysis for 18 in and 30 in pipe.

Feb. 98 - May 2004

Engineering Consultant

Ultramarine Engineers and Analysts, Houston, TX, USA

- ◇ Technip. Holstein Truss-Spar. Loadout and Floatoff operations. Truss - Hard tank mating operations. Mating tank removal operation.
- ◇ Saipem SA. Erha FPSO. Hull Hydro-Structural model prepared with Builder3D, a model generator software developed by Marcelo Canga.
- ◇ Technip-Cofflexip. Holstein Truss-Spar. Structural analysis of transportation and upending operations. Fatigue analysis during wet tow. Modeling and fatigue analysis of hull strakes during wet tow.
- ◇ Shell. Bonga FPSO. Suction Pile Mooring installation analysis.
- ◇ ICA. Chiapas bridge project in Chiapas, Mexico. Project manager and Chief Engineer. Innovative installation design of 8 jackets using offshore technology. Launch, transportation, upending and positioning. Responsible for all communications with Mexican Construction Contractor, Mexican Design Engineers and the Department of Transportation, Mexico. In addition, Technical Lead for all installation engineering for the project
- ◇ Responsible for successful bid for the Chiapas bridge project in Chiapas, Mexico
- ◇ Shell. Marine Advisory System documentation project.
- ◇ OPE. Stability and bollard pull analysis for AMT carrier barge.
- ◇ CSO-Aker. Mountain Horn. Quality assurance consultant for the Truss-Spar upending operation
- ◇ Ultramarine. Responsible for software development for the analysis and design of floating marine structures
- ◇ Ultramarine. Developed a three and four node shell element for incorporation in the MOSES analysis software
- ◇ Paragon Engineering Services. Flotation and upend analyses of a three leg jacket for Benchamas BWD project.
- ◇ Paragon Engineering Services. Flotation and upend analysis of a four leg jacket for the High Island Block A368 project.
- ◇ Alliance Engineering. Transportation analyses of the Dong-Fang project jackets and decks; flotation and upend analyses of two jackets; launch analysis of a four leg jacket. Work included stress and fatigue analysis.
- ◇ Lowe Offshore. Flotation and upend analysis of a three leg jacket for the South Marsh Island project.

Dec. 97 - Feb. 98

Post-Doc Research Associate

TICAM, University of Texas at Austin, USA.

- ◇ Large scale computations of composite material models.

June 93 - Dec. 97

Research Assistant.

University of Texas at Austin, Austin, TX, USA.

- ◇ Developed a 3D object oriented Finite Element Code (C++). The code supports hyperelastic and viscoelastic material models; direct and iterative solvers
- ◇ Studied friction laws for deformable-deformable 3D contact algorithms
- ◇ Developed numerical techniques for the solution of viscoelastic materials subjected to large deformations and damage
- ◇ Developed iterative techniques for nearly incompressible materials such as rubber

Research supported by the National Science Foundation.

June 95 - Feb. 98

Engineering Consultant

MSI, Austin, TX, USA.

- ◇ Thiokol Corporation. Developed a finite element numerical algorithm for the constitutive modeling of solid rocket propellants.
- ◇ Medical Carbon Research Institute. Conducted the fluid mechanic analysis of blood flow through a valve heart. Commercial software packages used: FLUENT, CFD-ACE, ProEngineer.
- ◇ International Fatigue Life Research Project. Analyzed the fatigue life prediction of rubber components.
- ◇ MSI. Developed 3D friction models for FLEXPAC, a 3D finite element program.

March 93 - May 93

Engineering Consultant

Hemarsa, civil engineering construction company. Buenos Aires. Argentina.

- ◇ Land recovery from the river "Rio de La Plata": designed and analyzed retaining walls and piles. (Rio de la Plata)

Sept. 90 - Feb 93

Research Assistant.

Carnegie Mellon University, Pittsburgh, PA, USA.

- ◇ Developed 2D and 3D Finite Elements codes for the modeling of thermoelastoplastic deformation of materials in industrial metal forming processes
- ◇ Developed and implemented models of elastoplastic contact with arbitrary friction laws
- ◇ Developed a 2D explicit dynamic code
- ◇ Studied the closure of centerline porosity in flat rolling of thick steel plates
- ◇ Collaborated in the modeling of the Hot Isostatic Pressing of metallic powders. Research supported by the National Science Foundation.

Oct. 88 - Sept. 90

Engineer.

SIDERCA , integrated seamless steel tube manufacturer, Buenos Aires, Argentina.

- ◊ Studied the thermo-mechanical behavior of the material during the continuous casting of steel
- ◊ Developed a finite element flow model for viscoplastic materials (steel at elevated temperatures)
- ◊ Participated in several engineering projects.

1987 - 1988

Research Assistant.
University of Buenos Aires, Buenos Aires, Argentina.

Dissertation topic: "Structural stability of circular arcs subjected to concentrated loads." Research supported by the University of Buenos Aires.

TEACHING EXPERIENCE

1995 - 1996

"Application of Finite Element Methods," Teaching assistant, ASE/EM, University of Texas.

1995 - 1996

"Finite Element Methods," Teaching assistant, ASE/EM, University of Texas.

1989 - 1990

"The Finite Element Method applied to Solid Mechanics," Teaching assistant, Institute of Materials and Structures, University of Buenos Aires.

1985 - 1986

"Analysis III," Teaching assistant, School of Engineering, University of Buenos Aires.

PUBLICATIONS

M. Canga, E. Becker, and Şebnem Özüpek. Constitutive modeling of viscoelastic materials with damage - computational aspects. *Comput. Meth. Appl. Mech. Engrg.*, 190(15-17):2207 – 2226, 2001.

M. Canga and E. Becker. An iterative technique for the finite element analysis of near-incompressible materials. *Comput. Meth. Appl. Mech. Engrg.*, 170(1-2):79–101, 1999.

E. Becker, M. Canga, and Şebnem Özüpek. Nonlinear viscoelastic constitutive model with damage for propellant. In *JANNAF Working Group on Mechanical Behavior*, Salt Lake City, Utah, March 1998. Defense material, not released.

Marcelo E. Canga. *An Iterative Algorithm For The Finite Element Analysis of Near-Incompressible Materials*. PhD thesis, University of Texas, Austin, December 1997.

M. Canga, T. Miller, and E. Becker. A displacement based friction algorithm. In *International Fatigue Life Research Project*, number IFL/23, Austin, Texas, April 1994.

M. Canga and E. Becker. An iterative technique for the solution of finite element analysis applied to near-incompressible materials. NSF #CDR-8721512, University of Texas, Offshore Technology Research Center, Austin, Texas, July 1996.

M. Canga and E. Becker. State of the art in the modeling of cracks in elastomeric bearings. NSF #CDR-8721512, University of Texas, Offshore Technology Research Center, Austin, Texas, September 1994.

J. Trasorras, M. Canga, and W. Eisen. Modeling the hot isostatic pressing of titanium parts to near-net shape. In *Advances in Powder Metallurgy and Particulate Materials*, volume 7, pages 51–69, Princeton, New Jersey, 1994. American Powder Metallurgy Institute.

E. Dvorkin and M. Canga. Incompressible viscoplastic flow analysis using a quadrilateral 2d element based on mixed interpolation of tensorial components. *Communications in Numerical Methods in Engineering*, 9(2):157–164, 1993.

E. Oñate, E. Dvorkin, M. Canga, and J. Oliver. On the calculation of the tangent matrix for geometric nonlinear analysis using continuum based beam/shell elements. In W.B. Kratzig and E. Oñate, editors, *Computational Mechanics of Nonlinear Response of Shells*, 1990.

E. Dvorkin and M. Canga. On the geometric non-linearities of structural elements. In *MECOM 88*, Córdoba, Argentina, 1988. XI Latin-American and Iberian Congress on Computational Methods for Engineering.

November 2011