

## MARINE, PORT WORKS AND SHIPYARDS SERVICES

Based in Greece, PARALOS S.A. ([www.paralos-tech.gr](http://www.paralos-tech.gr)) is a highly experienced EPC Contractor and Engineering House, enjoying the respect of players in the heavy industry and energy sectors in the greater region. PARALOS is ISO9001 certified for marine works and has successfully implemented challenging projects in the MARTIME Industry, offering turn-key solutions such as:

- Detailed design and installation of port loading/off loading facilities, port electromechanical infrastructure, HV and MV Substations for permanent dry and floating docks
- Detailed Engineering and construction of mooring and anchorage systems, customized buoys and underwater pipelines. Development of simulation scenarios for naval vessels safe approach to port and mooring, through specialized computer simulation software. (Navigation Studies and Simulation in Cooperation with NTUA (ΕΜΠ) prof. S.Mavrakos)
- Design and construction of customized buoys, through a vertically developed production process plan, as per customers' requirements.
- Shipyards' Infrastructure projects. Design and Construction of Workshops, Submarine Hangars, Shipbuilding berths.

An indicative list of our marine projects concluded on behalf of our international clients is depicted below, while relevant certifications and CV's are attached:

CLIENT	PROJECT DESCRIPTION	YEAR
LAFARGE HOLCIM VOLOS PLANT	Full EPC development of mooring system for Volos factory port including customized buoys construction and on-site anchorage installation, mooring state permits application compilation and issue	2016
LAFARGE HOLCIM VOLOS PLANT	Redesign and installation of the port loading systems at the pier of Volos factory for increasing the operational loading capacity	2013
THYSSEN KRUPP MARINE SYSTEMS	Operational improvements implementation study and installations at the permanent dry and floating docks of Skaramanga Hellenic Shipyards	2006-2010
THYSSEN KRUPP MARINE SYSTEMS	Erection of 17 Medium Voltage substations, Medium Voltage cable pulling and major improvements in the 150 KV substation focusing on the renovation of the Shipyards infrastructure for the construction of 4 new hybrid submarines	2006-2008
PPC PAROS & MYKONOS ISLAND PLANTS	EPC development of mooring systems for the ports of Mykonos and Paros including customized buoys construction and on-site anchorage installation as well as mooring state permits application compilation and issuing	2017
MOTOR OIL NEA KARVALI FACILITY	Oil tankers new mooring application study for the facility port, Underwater fuels receiving pipelines design and implementation study	2019
CORAL THESSALONIKI	Oil tankers new mooring application study for the facility port, Underwater fuels receiving pipelines design and implementation study	2019
SKYRA VASSAS LEMESSOS	Complete Anchoring system and Special Purpose Boys. Engineering and Supply	2019
MOTOR OIL NEA KARVALI FACILITY	Pigging operational improvements study focusing on clearing the oil residuals of the last unloading in the receiving pipeline	2020
RAPI GAS RODOS	Licensing of existing pier facilities and fuel receiving pipeline. Pier facilities operational improvements study	2020



19 - 11 - 2007

## **CERTIFICATE**

We certify that PARALOS ENGINEERING S.A. has successfully and on time completed the erection works for the Heavy Machine Shop new Electrical Installation.

The project was executed on "turn key" basis (design, procurement, installation) and mainly included:

- Study & design of Heavy Machine Shop's new electrical installation.
- Design, construction & installation of LV Switchgears.
- Provision, installation, ~~termination~~ & commissioning of:
  - Main power supply cables from MV Substation.
  - Machinery power cables.
  - Indoor, outdoor & emergency lighting systems.
  - Lightning protection & grounding system.
  - LV & Data systems in HMS's offices.

**L. WINTER**  
Infrastructure  
Projects

**G. VENTOURIS**  
Head  
of Electrical

Volos Plant 14.04.2016

## ΒΕΒΑΙΩΣΗ

Η ΑΝΩΝΥΜΟΣ ΕΤΑΙΡΙΑ ΤΣΙΜΕΝΤΩΝ ΑΓΕΤ ΗΡΑΚΛΗΣ - LAFARGE Group βεβαιώνει ότι η εταιρία PARALOS S.A. ολοκλήρωσε επιτυχώς το έργο της Μελέτης, Αδειοδότησης και Υλοποίησης του έργου πόντισης νέου ναυδέτου για το λιμάνι του εργοστασίου της εταιρίας μας στο ΒΟΛΟ.

Το έργο υλοποιήθηκε εξ ολοκλήρου από την ΠΑΡΑΛΟΣ ΑΕ κατά το έτος 2015 περιλαμβάνοντας :

1. Πλήρης Εκπόνηση των απαιτούμενων μελετών.
2. Συγκρότηση του φακέλου υποβολής και κατάθεση αυτού στις αρμόδιες αρχές.
3. Προώθηση και παρακολούθηση του θέματος και επικοινωνία με τις αρχές.
4. Μέριμνα για την έκδοση της άδειας.
5. Προμήθεια απαιτούμενου εξοπλισμού και υλικών.
6. Μελέτη και κατάστρωση σχεδίου πόντισης.
7. Εργασίες Πόντισης και αγκύρωσης του νέου ναυδέτου.



Nikolas Manolis  
Expedition Manager & Port Facilities ISPS officer  
Volos Cement Plant  
Heracles-Lafarge Greece



Volos Plant 9.10.2012

## CERTIFICATE

HERACLES GENERAL CEMENT COMPANY – LAFARGE Group hereby certifies that PARALOS Engineering S.A. has successfully completed and according to the contract requirements the EPC Project : “SLINGS TRANSPORTATION SYSTEM” for Volos Plant,

The Project was executed from July 2012 to September 2012 and mainly included:

- A. Complete Study, Detailed design, and Engineering of Mechanical, Electrical and Automation Processes.
- B. Fabrication of lifting equipment & hydraulics, rails, transportation cart, steel constructions, drive systems, etc.
- C. Development, Implementation and Installation of Automation Software
- D. Infrastructure Civil works (tunnel, access points, modifications and adaptation).
- E. Installation of all system components.
- F. Commissioning works, Performance tests & Personnel training.

For HERACLES G.C.C.

  
**A. KOTZAKOLIOS**

New Projects Manager

Lafarge, Volos Plant



### Memo - Σημείωμα

Skaramangas 20-11-08

#### Reference letter

We certify that PARALOS ENGINEERING S.A. has successfully and in time completed all project works for the Supply and Installation of Heating and Ventilation System of the Heavy Machine Shop.

The project was executed on "turn key" basis (design, procurement, installation) and mainly included:

- Study & Design of Heavy Machine Shop's Heating and Ventilation System
- Design & Construction of civil works for boiler and fuel tank facilities
- Installation & Commissioning of piping system
- Procurement, Installation & Commissioning of related equipment
- Procurement, Installation & Commissioning of related electrical and automation system

**L. Winter**

Head of Infrastructure Projects

**A. Pappas**

PM Infrastructure Projects



## CERTIFICATE

We hereby certify that PARALOS ENGINEERING S.A. has been assigned as Subcontractor under the Main Contractor "Siemens S.A." and has successfully and on time completed the erection works for the upgrade of the electrical distribution system of the Shipyards.

The works mainly included:

- Erection of 17 Medium Voltage Substations
- Upgrade of High Voltage (150kV) Substation
  - Replacement of MV switchgear
  - Installation of LV and control circuits
  - Reinforcement of the grounding system
  - Installation of MV cables
  - Replacement and adjustments of two HV tap changers' controllers
- Implementation of Protection Selectivity Study
- Settings and adjustments of MV protection equipment
- Testing, commissioning and start-up of all MV installations
- Training of the Shipyards personnel

For Hellenic Shipyards S.A.

Lars Winter  
Infrastructure Projects

George Ventouris  
Head of Electrical Department



Memo - Σημείωμα

TO: Mr. G.Christopoulos  
ΠΡΟΣ: PARALOS SA

FROM: Mr.J. Vogel  
ΑΠΟ: Mr.A.Pappas

C.C.: Mr. L. Winter  
ΚΟΙΝΟΠΟΙΗΣΗ:

DIVISION-DEPARTMENT: Yard Operations  
ΔΙΕΥΘΥΝΣΗ – ΤΜΗΜΑ:

YOUR REFERENCE:  
ΕΝΔΕΙΞΕΙΣ ΣΑΣ:  
NUMBER OF PAGES: - 1 -  
ΑΡΙΘΜΟΣ ΣΕΛΙΔΩΝ:

OUR REFERENCE: **No. HSY 015/07**  
ΕΝΔΕΙΞΕΙΣ ΜΑΣ:

DATE: 23/01/2007  
ΗΜΕΡΟΜΗΝΙΑ:

SUBJECT: **Medium Voltage Cable-Pulling Reference Letter**  
ΘΕΜΑ:

Dear Mr. Christopoulos,


Answering to your request as per your fax no. 0426, dated 27-12-06 we would like to certify that Paralos Engineering S.A. has completed successfully and on time the medium voltage cable pulling works according to our specifications.

The works included:

- Facilitation of pulling machinery, related equipment and personnel
- New MV cable 1x120 mm<sup>2</sup> pulled, 15.000 m
- Old MV cables dismantling and reinstallation, 4.500 m
- Insulation and continuity measurements according to VDE 0276-HD620



**J. Vogel**  
**Director Yard Operations**



**A. Pappas**  
**PM Infrastructure Projects**





10 - 10 - 2006

## **CERTIFICATE**

We certify that PARALOS ENGINEERING S.A. has completed successfully and on time repair works on No.1 Floating Dock Electrical Installation.

The works included:

- Replacement of Medium Voltage Circuit Breaker.
- Repair of Medium Voltage Cubicle.
- Supply and Installation of Low Voltage Switchgear.
- Power and Signal cables installation.
- Electrical Measurements of Power Transformer.



**G. PYRPYLIS**  
Manager  
Maintenance



**G. VENTOURIS**  
Responsible for  
Electrical Installations





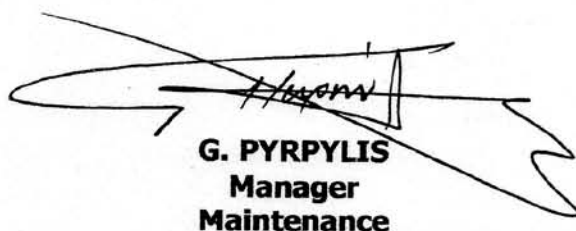
25 - 10 - 2006

## **CERTIFICATE**

We certify that PARALOS ENGINEERING S.A. has completed successfully and on time maintenance works of two (2) On Load Tap Changers of Shipyard's Voltage Transformers and repair works on 150 KV disconnecter switches.

The works included:

- Fully maintenance procedures and related works according manufacturer's directions (Machinenfabric Reinhausen).
- Supply and Installation of necessary spare parts.
- Inspection and Regulation of control parts.
- Inspection and Repair of 150 KV drive unit of the disconnecter switches.



**G. PYRPYLIS**  
Manager  
Maintenance



**G. VENTOURIS**  
Responsible for  
Electrical Installations




20 - 01 - 2006

## **CERTIFICATE**

We certify that PARALOS ENGINEERING S.A. has completed successfully and on time maintenance works in High and Medium Voltage Electrical Substations for Hellenic Shipyards S.A., according to our specification.

The works included:

- Supply and replacement of transformers insulating oil.  
(Shell Diala D, quantity  $\approx 14\text{tn}$ ).
- Treatment (filtering/dehydration) of insulating oil with special purifying device.  
(1 unit Transformer 150/20KV, 23 units Transformers 22/0,4 KV and 2 units Transformers 0,4/0,4KV).
- Disposal according to legal rules for the used insulating oil.
- Maintenance of Shipyard's High and Medium Voltage transformers.  
(Transformer cleaning by using special liquids, replacement of the silica gel, sealing of oil leakages, vaporization from all possible points, general inspection of all electrical connections etc).

  
**J. VOGEL**  
Director  
Yard Operations

  
**G. PYRPYLIS**  
Manager  
Maintenance

  
**G. VENTOURIS**  
Responsible for  
Electrical Installations



## **CURRICULUM VITAE**

**of**

### **Prof. Dr.-Ing. SPYROS A. MAVRAKOS**

*Director and President of the Board of Directors of the Hellenic Centre for Marine Research (HCMR),*

*Former Deputy Rector of Financial Programming and Development, NTUA,  
Director of the Laboratory for Floating Structures and Mooring Systems, NTUA,  
National Representative of the Ministry for Environment, Energy and Climate  
Change in the European Oil & Gas Authorities Group (EUOAG),*

*9, Heroon Polytechniou Ave., 157 73 Zografou / Athens, Greece*

*e-mail: [mavrakos@naval.ntua.gr](mailto:mavrakos@naval.ntua.gr)*

**Athens, May 2019**

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## 1. GENERAL BIOGRAPHICAL DATA

DATE OF BIRTH	28 November 1952
MARITAL STATUS	Married, two children
NATIONALITY	Greek
EDUCATION	<u>Secondary level:</u> Varvakios Muster School, Athen, 1964 – 1970  <u>University Level:</u> NATIONAL TECHNICAL UNIVERSITY OF ATHENS Diploma in Naval Architecture and Marine Engineering, Sept. 1976  RHEINISCH-WESTFAELISCHE TECHNISCHE HOCHSCHULE AACHEN (RWTH-Aachen), Germany, Dr.-Ing. in Ocean Engineering, Feb. 1981.

## 2. PROFESSIONAL HISTORY

Dec. 2015 -	Director and President of the Board of Directors of the Hellenic Centre for Marine Research
Oct. 1996 -	Professor of Floating Structures, School of Naval Architecture and Marine Engineering, National Technical University of Athens (NTUA)  Aug. 2010 – Oct. 2010: On Sabbatical leave, Visiting Prof., Technical University of Berlin, Germany, Institute of Ocean Engineering, Division of Naval Architecture and Ocean Engineering.
Sept. 1996 - July 1991	Associate Professor of Floating Structures, School of Naval Architecture and Marine Engineering, National Technical University of Athens (NTUA)

	Febr. 1992 - Aug. 1992: On Sabbatical leave, Visiting Professor, Department of Ocean Engineering, MIT, Massachusetts, Boston, USA
June 1991 - June 1987:	Assistant Professor of Floating Structures, School of Naval Architecture and Marine Engineering, National Technical University of Athens (NTUA)
May 1987 - April 1984:	Lecturer of Floating Structures, School of Naval Architecture and Marine Engineering, National Technical University of Athens (NTUA)
	Aug. 1985 - June 1985: Visiting Researcher, RWTH - Aachen, Technical University of Aachen, Northern Rhine - Westfalia, Department of Ocean Engineering, Germany.
March 1984 - March 1983:	Freelancer, Naval Architect and Marine Engineer
Febr. 1983 - Jan. 1982:	Military Service in the Hellenic Navy
Dec.1981 - Febr. 1980:	Research Engineer, Department of Mechanical Engineering, Division of Ocean Engineering, RWTH-Aachen
Jan. 1980 - Nov. 1976:	Research Assistant, Department of Mechanical Engineering, Division of Ocean Engineering, RWTH-Aachen

### 3. RESEARCH INTERESTS

1. Development of theoretical and experimental methods and computer software for the linear and non-linear hydrodynamic analysis (diffraction and radiation problems) of single or multiple interacting large volume floating structures. Evaluation of the first- and second - order sea loads and motions with applications to:
  - ✓ Hydrodynamic analysis and design of several types of offshore structures for the ocean exploration and exploitation (offshore hydrocarbon exploration, production and storage, floating terminals, wave energy converters, floating wind turbines, etc.)
  - ✓ Design of open sea fish-farming installations
  - ✓ Hydrodynamic analysis, design and evaluation of several types of floating breakwaters and floating marinas

2. Hydrodynamic analysis and design of oceanographic devices (oceanographic surface buoys, autonomous underwater vehicles - AUV's - for oceanographic applications, gliders)
3. Development of numerical and experimental methods and computer software for the static and dynamic analysis and optimum design of mooring systems for shallow- and deep-water applications
4. Numerical and experimental evaluation of the hydrodynamic behavior and the efficiency evaluation of several types of single or interacting wave energy converters (heaving devices, OWC's devices)
5. Numerical and experimental evaluation of the coupled hydro-aero-elastic behavior of moored offshore floating wind turbines and multi-purpose floating structures for the offshore wind and wave energy sources exploitation
6. Hydromechanic analysis of moored floating structures in frequency- and time-domain with applications to:
  - ✓ Hydromechanic analysis and design of offshore wind parks (evaluation of the loads and motions due to wave, wind and current action, analysis and design of the mooring system)
  - ✓ Analysis of the dynamic behavior of moored ships in harbors

#### **4. PROFESSIONAL SOCIETY MEMBERSHIPS**

- Technical Chamber of Greece (TEE)
- German Association of Mechanical Engineers (VDI)
- Society of Naval Architects and Marine Engineers (SNAME)
- Greek Association of Naval Architects
- Hellenic Institute of Marine Technology
- European Association of Ocean Energy - EAOE



## 5. UNIVERSITY PROFESSIONAL SERVICES

- Deputy Rector for Financial Programming and Development (Sept. 2014 – Nov. 2015)
- Chair, Research Committee, National Technical University of Athens (Sept. 2014 – Nov. 2015)
- Head of the School of Naval Architecture and Marine Engineering, National Technical University of Athens, 1999-2001
- Head of the Marine Structures Division of the School of Naval Architects and Marine Engineers, National Technical University of Athens, Sept. 2003 – Aug. 2007, Sept. 2013 – Aug. 2014
- Director, Laboratory for Floating Structures and Mooring Systems, <http://lfsms.naval.ntua.gr/>, School of Naval Architects and Marine Engineering, 2005 -
- Director, Post-Graduate Course in “Marine and Ocean Technology and Science” (1998 –). Collaborating Departments: Naval Architecture and Marine Engineering (Coordinator), Mechanical Engineering, Electrical and Computer Engineering, Rural and Surveying Engineering, Applied Mathematical and Physical Science from the National Technical University of Athens, The Department of Physics from the National and Kapodistrian University of Athens, and the Hellenic Center for Marine Research (HCMR).
- Coordinator from the NTUA site for the development of a Post – Graduate Course on “Offshore Structures, Systems and Processes for the Hydrocarbon Exploration and Exploitation”. Collaborating Departments: Naval Architecture and Marine Engineering (Coordinator), Mechanical Engineering, Chemical Engineering, Civil Engineering, Mining and Metallurgical Engineering, Rural and Surveying Engineering from the National Technical University of Athens, Mechanical Engineering Department from the University of Thessaly, Department of International and European Studies from the Panteion University and the National Center for Marine Research (NCMR).
- Member, Research Committee, National Technical University of Athens (Sept. 2009 – Aug. 2014)
- Deputy Head, Council for Post-Graduate Studies, National Technical University of Athens, 2003 – 2006, 2010 – 2014.
- Member, Council for Post – Graduate Education, National Technical University of Athens, 1997 – 2014.
- Member, Board of Directors of the Technological Park of Lavrion S.A. (2009 - 2014).
- Deputy Head, Department of Naval Architecture and Marine Engineering, National Technical University of Athens, 1993- 1997.
- Member of the elective body for the nomination of University faculty members (University of Piraeus, University of Aegean, Aristotle University of Salonika, Higher Technological Institution of Athens)

- Member of the independent evaluation Committee for the Maritime Education provided by professional centers of the Ministry of Merchant Marine (3636/17.2.2003 Ministerial Decision)
- Member, Continuing Education Council, National Technical University of Athens, 1993-1997.
- Member, Committee of the Computer Center, National Technical University of Athens, 1984-1994.
- Chairman, Committee for Establishing the Greek Research Institute on Marine Technology and Ocean Engineering, National Technical University of Athens, 1993
- Member, Committee for establishing of Post-Graduate Studies on Ocean Engineering, National Technical University of Athens, 1993-1997.
- Member, National Academic Recognition Center, Committee for the Recognition of degrees in Naval Architecture and Marine Engineers that were obtained abroad, 1984 - 1996

## 6. SCIENTIFIC AND PROFESSIONAL ACTIVITIES

- Director and President of the Board of Directors of the Hellenic Center for Marine Research (HCMR, Dec. 2015 - ).
- Chairman, Committee established in the Ministry for Environment, Energy and Climate Change for the transition into Greek Law of the 2013/30/EU European Directive on safety of offshore hydrocarbon activities (Sept. 2013 - March 2016)
- Appointed as Representative of the Greek Ministry for Environment, Energy and Climate Change in the EU Offshore Oil and Gas Authorities Group, EUOAG, (Oct. 2012 - March 2017). Ministerial Decision Δ16/Φ2.15/19983 /1109/ 9/10/2012
- Member and Acting Chairman of the Committee established by the Greek Ministry for Environment, Energy and Climate Change for formulating Greek positions on the Proposal for a EU Directive on safety of offshore oil and gas prospection, exploration and production Activities (Dec. 2011- Dec. 2013)
- EU independent review expert for the periodic review of SME Action projects (SME and SME-AG) within FP7 managed by the Research Executive Agency (REA) (1/7/2011 - 31/1/2012 and from 1/1/2013 - 31/8/2013).
- Appointed by Science Foundation Ireland (ISF) to participate as independent expert in the proposals' review of Irish "Research Infrastructure Call 2012" (19/6/2012 - 25/7/2012).
- Appointed by the Irish Science Foundation (ISF) for a Program Progress Site Review at the Hydraulic and Maritime Research Centre, University College Cork (6/4/2011 - 15/7/2011)
- Chairman of the 26<sup>th</sup> International Workshop on Water Waves and Floating Bodies (IWWF2011), 17-20 April 2011, Athens, Greece

- Chairman of the 24<sup>th</sup> International Conference on Offshore Mechanics and Arctic Engineering (OMAE2005, 12 - 17 June 2005, Chalkidiki, Greece)
- Chairman of the 10<sup>th</sup> International Conference of the Maritime Association of the Mediterranean (IMAM 2002, May 2002, Rethymnon, Crete)
- Member of the Technical Scientific Committee of the 7<sup>th</sup>, 8<sup>th</sup>, 9<sup>th</sup>, 10<sup>th</sup> and 11<sup>th</sup> European Wave and Tidal Energy Conferences (EWTEC, 7<sup>th</sup> Conference: Sept. 2007, Porto, Portugal; 8<sup>th</sup> Conference: Sept. 2009, Uppsala, Sweden; 9<sup>th</sup> Conference: Sept. 2011, Southampton, U.K.; 10<sup>th</sup> Conference: Aalborg, Sept. 2013, Denmark; 11<sup>th</sup> Conference: Sept. 2015, Nantes, France)
- Member of the technical program committee of the Offshore Mechanics and Arctic Engineering Conferences (OMAE2006, OMAE2007, OMAE2008, OMAE2009, OMAE2010, OMAE2011, OMAE2012)
- Member of the Technical Program Committee of the 22<sup>nd</sup> International Offshore (Ocean) and Polar Engineering Conference (ISOPE 2012).
- General Secretary, Hellenic Institute of Marine Technology, 1998 - 2000
- Vice President, Hellenic Institute of Marine Technology, 2000 - 2002
- Visiting Professor, Technical University of Berlin, Germany, Institute of Ocean Engineering, Division of Naval Architecture and Ocean Engineering. Aug. 2010 - Oct. 2010 (on sabbatical leave)
- Visiting Professor at the Ocean Engineering Department of the Massachusetts Institute of Technology (MIT), Feb. 1992 - Aug. 1992 (on sabbatical leave)
- Visiting Researcher, Division of Ocean Engineering, RWTH - Aachen, July - August 1985.
- Member, Editorial Board "Journal for Underwater Technology", 1997 - 2002
- Member, Editorial Board "Journal of Marine Structures", 2007 -
- Member, Editorial Board, Journal of Marine Science and Engineering, Section Ocean Engineering, 2018 -
- Member, Committee V.7 - Slender Marine Structures, International Ship and Offshore Structures Congress (ISSC), 1988-1994.
- Member, Committee I.2 - Loads, International Ship and Offshore Structures Congress (ISSC), 1994-2000 and 2003-2009
- Member, Committee V.5 - Floating Production Systems, International Ship and Offshore Structures Congress (ISSC), 2000-2003.
- Member, Committee V.4 - Ocean Wave and Wind Energy Utilization, International Ship and Offshore Structures Congress (ISSC), 2009-2015.
- Member, Committee V.8 - Subsea Technology, International Ship and Offshore Structures Congress (ISSC), 2015-2018.
- Participant, Invited participation in an International Comparative Study on the Hydrodynamic Analysis of large floating production systems (FPS 2000) organized by Norsk-Hydro (Nov. 1989).

- Co-organizer and Scientific responsible of an International Comparative Study on the prediction of the mooring induced damping of floating structures in the framework of the I.2 Committee on Loads, ISSC'97
- Scientific responsible of the Working Group on the Efficiency of Floating Breakwaters, Technical Chamber of Greece (TEE), 1992-1995.
- Member, Working Group on Marine and Ocean Engineering, Technical Chamber of Greece, 1993-1995.
- Member, Short list of Experts of the Directorate General for Energy, Hydrocarbon Division, E.U., for providing service in the field of Energy.
- Member, Committee for the selection of technical personnel for the "Hellenic Shipyards S.A.", May 1999.
- Lecturer, in vocational seminars of the Greek Society of Naval Architects for young professionals on the subjects of "Hydrodynamic Characteristics of Marine Structures" and "Analysis and Design of Mooring Systems for Ships and Offshore Structures" (October 1989, 1990).
- Reviewer of International Journals, Conferences and Research Programs as follows:  
*Journal of Fluid and Structures, Energy, Journal of Engineering Mathematics, Journal of Ocean Engineering, Journal of Applied Ocean Research, Journal of Marine Structures, Journal of Marine Science and Technology, IEEE Journal of Oceanic Engineering, Journal of Engineering for the Maritime Environment, IET International Power Generation Journal, Journal of Offshore and Polar Engineering, Journal of Offshore Mechanics and Arctic Engineering, Scientific Journal of the Technical Chamber of Greece, IWWWFB2011, IWWWFB2012, IWWWFB2013, OMAE2014, OMAE2013, OMAE2012, OMAE2011, OMAE2010, OMAE2009, OMAE2008, OMAE2007, OMAE2006, OMAE2005, STAB2012 (11<sup>th</sup> International Conference on the Stability of Ships and Ocean Structures), EWTEC2007, EWTEC2009, EWTEC2011, EWTEC2013, ISOPE2012, ISOPE2011, ISOPE2010, ISOPE2008, ISOPE2007, ISOPE2006, ISOPE2005, ISOPE'92, ISOPE'96, IMAM2002, IMAEM1990, EUROMS 90, 3<sup>rd</sup> National Congress on Theoretical and Applied Mechanics, International Symposium on Computational Structures Technology (CST' 94), Reviewer of Research Programs for the Greek General Secretariat of Research and Development, Reviewer of Research Programs for the Greek Organization for Small and Medium Size Enterprises.*
- Member of the evaluation committee for research programs supported by the Cypriot Research Fostering Foundation (2008 – 2009).
- Session Chairman in OMAE2005, OMAE2006, OMAE2008, OMAE2013, 7<sup>th</sup> European Wave and Tidal Energy Conference (EWTEC2009), 8<sup>th</sup> European Wave and Tidal Energy Conference (EWTEC2010), Offshore Mechanics and Polar Engineering (ISOPE' 92).
- Chairman, Committee for Doctoral Title Award, Department of Ocean Engineering, M.I.T., June 1992.

- Member, Committee for Award of the Honorary Doctoral Degree to the Professors Francis Ogilvie, M.I.T. and Horst Nowacki, Technical University of Berlin, 1996.
- Member, Steering Committee of the 25th West European Graduate Education in Marine Technology (WEGEMT) School on “Surface Support of Subsea Activities: Dynamics and Control in Extreme Environments”, University of Strathclyde, Department of Ship & Marine Technology, Sept. 1996.

# Mobil Oil Hellas A. E. Petroleum Company

194 SYNGROU AVE.  
ATHENS, GREECE

TELEPHONE 951-3111  
951-4111

CABLE ADDRESS MOBILOIL - ATHENS  
TELEX 215150  
FAX No. 9501238

## C E R T I F I C A T E

It is hereby certified that Mr. Apostolos Pappas (Mechanical Engineer B.Sc., Management Science/Operations Research M.Sc.) has executed successfully on behalf of Mobil Oil Hellas the following projects:

1992 - 1995

A. MOBIL OIL HELLAS SALONICA FUELS TERMINAL 2nd EXPANSION  
(Budget: 1.900.000 U.S. Dollars 450.000.000 DRS)

- Three vertical cylindrical tanks:  
2700 m3, 6900 m3, 2130 m3 correspondingly
- Fuel pipelines
- Product separation "pig" system/fuel receiving and discharging automations, valves motorization.
- Fuel level gauging automations
- Fuel additive injection systems
- Introduction of the new type "Super-Unleaded" Gasoline in the installation
- Railway through the installation
- New tanks dyke
- New fire fighting system
- Fire fighting tanks enlargement (using finite element analysis on the key structural points)

Mr. A. Pappas was responsible for the conception design as well as for the technical and financial Supervision of the project. (Project Manager)

./...

ΜΟΒΙΛ ΟΙΛ ΕΛΛΑΣ Α.Ε.  
ΕΤΑΙΡΕΙΑ ΠΕΤΡΕΛΑΙΩΝ  
ΛΕΩΦ. ΣΥΓΓΡΟΥ 194  
176 71 ΚΑΛΛΙΘΕΑ



- 2 -

B. MOBIL OIL HELLAS KRETE (LINOPELAMATA) FUELS TERMINAL UNDERWATER RECEIVING PIPELINE (Budget: 330.000 U.S. Dollars 80.000.000 DRS).

Mr. A. Pappas was responsible for the conception design as well as for the technical and financial supervision of the project. (Project Manager)  
MOBIL OIL appropriated for Mr. A. Pappas scuba diving training and he was therefore able to supervise and photograph the whole underwater installation.

1991-1992

A. LPG INSTALLATION AT "METAXA" DISTILLERS  
(Budget 65.000 U.S. Dollars 16.000.000 DRS).

B. LPG INSTALLATION AT "YFADIS" SAUSAGE MAKERS  
(Budget 60.000.000 U.S. Dollars 15.000.000 DRS)

Mr. Pappas was responsible for the conception design as well as for the technical and financial supervision (Project Manager) of the above mentioned projects.

E. MOBIL OIL HELLAS LUBES BLENDING PLANT RE-ORGANIZATION  
(ISO CERTIFICATE ACQUISITION)  
(Budget 2.500.000 U.S. dollars 600.000.000 DRS)

Mr. Pappas was responsible for the conception design of the project (1/3 of the Budget)

D. MOBIL OIL HELLAS KRETE LINOPELAMATA EXPANSION  
(Budget: 500.000 U.S. dollars 120.000.000 DRS)

- Two cylindrical vertical fuel tanks: 2500 m3 1890 m3 correspondingly
- Fuel pipelines
- Automatic level gauging, level alarms
- Fire fighting system
- Valves motorization
- Product separation "pig" system/fuel receiving and discharging automations

Mr A. Pappas was responsible for the conception design of the project.

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ΜΟΜΠΙΛ ΟΤΑ ΕΛΛΑΣ Α.Ε.  
ΕΤΑΙΡΕΙΑ ΠΕΤΡΕΛΑΙΩΝ  
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176 71 ΚΑΛΛΙΘΕΑ





- 3 -

E. MOBIL OIL HELLAS SALONICA FUELS TERMINAL 1st EXPANSION  
(Budget 2.000.000 USD 480.000.000 DRS)

- 4 vertical cylindrical tanks 3000 m3, 3500 m3, 1500 m3, 2900 m3 correspondingly
- Fuel pipelines
- Fuel pump station
- Tank truck filling racks (bottom loading)
- Fire Fighting system

Mr A. Pappas was responsible for the conception design of the project. (1/3 of the Budget).

F. MOBIL OIL HELLAS LUBES BLENDING PLANT NEW BLENDING KETTLE  
(Budget 40.000 U.S. dollars 10.000.000 DRS)

Mr. A. Pappas was responsible for the conception design as well as for the technical and financial supervision of the project.

G. MOBIL OIL HELLAS ASPROPYRGOS FUELS TERMINAL ELECTRICAL GENERATOR  
INSTALLATION  
(Budget 80.000 U.S. dollars 20.000.000 DRS)

Mr. A. Pappas was responsible for the conception design of the total electrical circuit as well as for the technical and financial supervision of the project.

D. Houndras  
Technical Manager

ΜΟΜΒΙΛ ΟΙΛ ΕΛΛΑΣ Α.Ε.  
ΕΤΑΙΡΕΙΑ ΠΕΤΡΕΛΑΙΩΝ  
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## **ΧΡΗΣΗ ΚΑΤΑΛΛΗΛΟΥ ΛΟΓΙΣΜΙΚΟΥ/ ΑΝΑΛΥΤΙΚΟΣ ΠΡΟΣΔΙΟΡΙΣΜΟΣ**

Για την την υλοποίηση της μελέτης θα διατεθεί και χρησιμοποιηθεί εκτεταμένη βιβλιοθήκη λογισμικού, όπως παρακάτω αναφέρεται:

### **1. Λογισμικό μελετών κυματικών συνθηκών και μεταφοράς ιζημάτων**

#### **1α. Μαθηματικά ομοιώματα πρόβλεψης κυματικών συνθηκών:**

##### **i. Με άδεια από το DHI (Danish Hydraulic Institute - Denmark):**

- MIKE 21-SW για πρόβλεψη κυματικών συνθηκών στα «ανοιχτά» και στα όρια λιμενικού έργου
- MIKE 21-BW για πρόβλεψη διαταραχών εντός λιμενολεκάνης

##### **ii. Λογισμικό επί των παραπάνω αντικειμένων που έχει αναπτυχθεί από την Εταιρία.**

#### **1β. Μαθηματικά ομοιώματα μεταφοράς ιζημάτων και εξέλιξης ακτογραμμής:**

- LITPACK με άδεια από το DHI (Danish Hydraulic Institute - Denmark)

### **2. Λογισμικό Μελετών Λιμενικών Έργων**

Το λογισμικό επί των παραπάνω αντικειμένων έχει αναπτυχθεί από την Εταιρία και αφορά σε υπολογισμούς κυματοθραυστών, κρηπιδοτοίχων και λοιπών λιμενικών και θαλασσίων έργων.

### **3. Λογισμικό Γεωγραφικού Συστήματος Πληροφοριών**

- ESRI ARC GIS, ArcView 8.1

### **4. Λογισμικό Στατικών Μελετών**

- SOFISTIK (SOFISTIK A.G. Deutschland) – Πρόγραμμα υπολογισμού γενικών 3D φορέων από πεπερασμένα στοιχεία, με στατική και δυναμική ανάλυση
- STATICS 2008 (Multisoft) – Πρόγραμμα ανάλυσης κτιριακών έργων
- CADRE Pro (Cadre Analytic)

5. Λογισμικό Γεωτεχνικών Μελετών

- LARIX-G (Cubus AG, Zürich) - Πρόγραμμα υπολογισμού τοίχων ορυγμάτων, πασσάλων και πασσαλοσανίδων
- LARIX-S (Cubus AG, Zürich) – Πρόγραμμα ελέγχου ευστάθειας πρανών ορυγμάτων, τοίχων αντιστήριξης και φραγμάτων
- ΤΟΙΧΟΣ ΑΝΤΙΣΤΗΡΙΞΗΣ (π-Systems International) - Πρόγραμμα ανάλυσης και ελέγχου τοίχων αντιστήριξης από σκυρόδεμα

6. Λογισμικό Η/Μ μελετών

- FINE-M (4m)
- AUTOFINE (4m)
- CADRE FLOW (Cadre Analytic)

7. Λογισμικό Περιβαλλοντικών Μελετών

- Cadna A(Datakustik GmbH, Germany)

8. CAD

- 5 άδειες AUTOCAD 2011 (Autodesk)
- 5 άδειες AUTOCAD Light 2011 (Autodesk)
- MathCad v. 2000 Premium (Mathsoft)

9. Λογισμικό Project Management

- Primavera Engineering and Construction (Version 4.1) (Primavera Systems Inc)
- ΤΕΥΧΗ (4M)

10. Λογισμικό Office Automation

- 10 άδειες MS OFFICE 2007
- 10 άδειες ESET NOD32 Antivirus™ 4.0.417.0
- Microsoft Visio Standard 2002 SR-1
- GRAPHER 10.0
- SURFER 11.0

11. Λογισμικό μαθηματικής προσομοίωσης πλοήγησης πλοίων

Για τη προσομοίωση και μελέτη των ελιγμών των πλοίων χρησιμοποιείται το υπολογιστικό πακέτο DYNASIM, το οποίο έχει αναπτυχθεί από την Εταιρία DYNAFLOW INC.

Το πεδίο εφαρμογών του μοντέλου DYNASIM περιλαμβάνει μεταξύ άλλων:

- Εκτίμηση ασφάλειας ναυσιπλοΐας
- Βελτίωση ασφάλειας ναυσιπλοΐας λιμένων
- Σχεδιασμός λιμένων και διαύλων ναυσιπλοΐας
- Εκπαίδευση πλοήγησης
- Αξιολόγηση σχεδιασμού πλοίου.

Το μοντέλο προσομοιώνει τα εξής:

- Κίνηση πλοίου
- Υδροδυναμική φόρτιση
- Φόρτιση πρόωσης και εξωτερικά φορτία.

Θεωρία του μοντέλου

Οι κύριες παραδοχές του μοντέλου είναι:

- η μη γραμμική θεωρία κίνησης, επιτάχυνσης, δυνάμεων, ροπών και αδρανειακών μαζών
- η αρχή διαμόρφωσης από διακριτά επί μέρους τμήματα.

Οι ανωτέρω εξισώσεις επιλύονται με προσαρμοστικές και πολυαντικειμενικές μαθηματικές μεθόδους επίλυσης και ελέγχου συστημάτων,

Δεδομένα του μοντέλου-γραφικά ή με αρχείο

- Γεωμετρικά και βυθομετρικά δεδομένα
- Πλήρη χαρακτηριστικά πλοίων σχεδιασμού
- Δυνατότητα εισόδου στοιχείων πλοίου με μοναδικά χαρακτηριστικά
- Ανεμολογικά στοιχεία
- Κυματικές συνθήκες, συνθήκες ρευμάτων και παλίρροιας
- Στοιχεία φάρων
- Γεωμετρία διαύλου
- Στοιχεία δρομολογίου
- Στοιχεία και τύποι ελιγμών
- Στοιχεία αυτόματου πιλότου
- Επιλογή κάθε τρόπου πλοήγησης
- Δυνατότητα ελέγχου από αρχείο, οθόνη ή joy-stick
- Δυνατότητα ρυμουλκού

#### Αποτελέσματα του μοντέλου

- Γραφική δυναμική απεικόνιση γέφυρας πλοίου σε πραγματικό χρόνο, με όλα τα στοιχεία ελέγχου
- Γραφική δυναμική τρισδιάστατη απεικόνιση πλοίου με γάστρα, άγκυρες, πηδάλια, προπέλες και πλευρικούς έλικες (bow thrusters).
- Γραφική τρισδιάστατη απεικόνιση θέσης και πορείας πλοίου και λιμενικών εγκαταστάσεων
- Εξαγωγή αρχείων, χαρτών, εικόνων και γραφημάτων με όλα τα ανωτέρω.

#### 12. Μαθηματική προσομοίωση περιβαλλοντικών φορτίσεων πλοίων και κατασκευών off-shore

12.1 Μαθηματικό μοντέλο WINDCURR: Υπολογισμός των μέσων φορτίσεων λόγω ανέμων και ρευμάτων.

12.2 Μαθηματικός κώδικας HAQS Χρησιμοποιείται για την υδροδυναμική ανάλυση του ελεύθερα επιπλέοντος πλοίου.

Επιλύονται τα προβλήματα περίθλασης και ακτινοβολίας, και υπολογίζονται οι δυνάμεις διέγερσης, οι υδροδυναμικοί συντελεστές, οι κινήσεις του σκάφους, καθώς και οι μέσες δυνάμεις δεύτερης τάξης παρουσία απλών αρμονικών και φυσικών θαλάσσιων κυματισμών.

Το πρώτο βήμα είναι η υδροδυναμική ανάλυση του σκάφους παρουσία απλών αρμονικών κυματισμών.

Ο κώδικας HAQS επιλύει τα προβλήματα περίθλασης (diffraction) και ακτινοβολίας (radiation) κατά την αλληλεπίδραση επιπλεόντων ή/και σταθερών σωμάτων με αρμονικούς επιφανειακούς κυματισμούς βαρύτητας λαμβάνοντας υπόψη τις μεγάλες διαστάσεις των σωμάτων και τις πιθανές μεταξύ τους υδροδυναμικές αλληλεπιδράσεις. Οι βασικές θεωρητικές παραδοχές που περιέχει είναι αυτές της γραμμικοποιημένης δυναμικής ροής δηλαδή:

- η κίνηση των κυματισμών είναι αρμονική
- η ροή είναι μη συνεκτική, ομογενής και ασυμπίεστη
- τα ύψη των κυμάτων και οι κινήσεις των σωμάτων είναι μικρές και κατά συνέπεια οι εξισώσεις κίνησης μπορούν να γραμμικοποιηθούν
- η κίνηση του ρευστού είναι αστρόβιλη, και κατά συνέπεια το πεδίο ροής μπορεί να περιγραφεί από ένα δυναμικό ταχύτητας, που πρέπει να ικανοποιεί την εξίσωση του Laplace σε ολόκληρο το χωρίο ροής, την κινηματική συνθήκη στον πυθμένα σύμφωνα με την οποία η κάθετη ταχύτητα της ροής σ' αυτόν πρέπει να ισούται με μηδέν, τη συνθήκη

στην ελεύθερη επιφάνεια καθώς και την κινηματική συνθήκη στις βρεχόμενες επιφάνειες των σωμάτων, η οποία απαιτεί ότι η κάθετη ταχύτητά τους πρέπει να ισούται με τη κάθετη ταχύτητα της ροής

13. Κώδικας επίλυσης αγκυρώσεων MSTACAB: Ημι-στατική ανάλυση συστήματος αγκύρωσης πολλαπλών κλάδων στον τρισδιάστατο χώρο. Κάθε γραμμή μπορεί να αποτελείται από συρματόσχοινο, αλυσίδα ή συνθετικό υλικό ή και συνδυασμό τους. Οι άγκυρες μπορεί να εύρισκονται σε διαφορετικό βάθος νερού και οι γραμμές να είναι εφοδιασμένες με πλωτήρες ή βάρη κατά το μήκος τους. Για δεδομένες εξωτερικές δυνάμεις στη πλωτή κατασκευή, υπολογίζονται οι τελικές θέσεις των γραμμών, η μέγιστη τάση κατά το μήκος τους, το ανυψωμένο μήκος των γραμμών, οι γραμμικοποιημένοι συντελεστές επαναφοράς, κλπ.
14. Μαθηματικά ομοιώματα μεταφοράς ιζημάτων και εξέλιξης ακτογραμμής:
- MIKE 21-HD για την πρόβλεψη θαλάσσιας κυκλοφορίας λόγω κυματισμών και παλίρροιας
  - MIKE 21-ST για την πρόβλεψη της στερεομεταφοράς μη συνεκτικών ιζημάτων σε ακτογραμμές
  - MIKE 21-Morphology για την χρονική απεικόνιση εξέλιξης ακτογραμμής λόγω στερεομεταφοράς.

Με εκτίμηση

Απόστολος Παππάς  
Μηχ/γος Μηχ/κός ΕΜΠChartered Eng./British Institution of Mechanical Engineers

