Exmar Group History

1820
Creation of the Boelwerf Shipyard

1960s
Boelwerf

1980s
Exmar - LPG

1990s
Arethusa Offshore

1991
Merg with CMB

1997
Exmar Offshore Co.

2003
Exmar and CMB De-Merge. Exmar Listed on Euronext “EXM”

From Ship Builder...

...To Ship Owner
The Exmar Group

LNG
- Shipping
- Floating Storage, Liquefaction, & Regas
- Design & Engineering
- Ship Management

LPG/NH3
- Shipping
- Floating Storage
- Design & Engineering
- Ship Management

Offshore
- Accommodation/Work Barge
- Floating Production & Storage
- Design & Engineering
- Operations & Maintenance

Services
- Shipmanagement
- Design & Engineering
- Brokerage Insurance
- Travel Plus
Offshore Assets and Services

**Owned Assets, Management, and Operations:**
- **Toscana** – FSRU 3.75 bcm/yr, 37,100m³, Italy

**Accommodation:**
- **Kissama** – 350 POB, Cameroon
- **Nunce** – 350/450 POB, Angola
- **Wariboko** – 300 POB, Nigeria

**Services:**
- Marine and Maintenance Services
- Pre Operations Engineering and Operational Services
- Staffing, Technical, Procurement, and Logistical Services
- ISO Certification and Asset Integrity Management

**Engineering Offices**
- **EOC, Houston**
- **DVO, Paris**
- **Exmar Technical, Antwerp**
Mission

EOC’s Design Scope

- **Production**
  - Focus on Semi submersibles, but other concepts as well
  - FPSO or FSO, new or conversion

- **MODU**
  - Semi submersibles
  - Harsh environments, Well intervention and work over
  - Conversions, upgrades, repairs

- **FLNG & FSRU**
  - Barge or ship shape

- **Modules and Major Modifications**
  - Living quarters
  - Sponsons, Fore/aft body replacement
  - Power plants
EOC Capabilities – Naval Architecture

- Concepts and layouts
- Seakeeping and Motions
- Hull Design and Stability Analysis
- DP Analysis
- Mooring Design and Analyses
- Inclining Experiments & Deadweight Surveys
- Model Testing – basin and wind tunnel
- Operability and downtime
- Airgap Analysis
- Dry tow and load out
Naval Architecture - Mooring

- Basic to Detailed design for Any Type of Mooring System
- Equipment Specification and Installation Procedures

ARIANE7:
- Time Domain Quasi-Dynamic
- Initial and Screening Analysis

ORCAFLEX:
- 3-D - Fully Coupled
- Non-Linear - Large Displacements
- Risers Bending & Torsion
- Bottom Topography
- Air Gap Verification
EOC Capabilities - Structural

- Global/Local Strength
- Fatigue Analyses
- Finite Element Modeling
- Detailed Engineering
- Sea Fastening & Transportation Vessel Interaction
EOC Capabilities – Mechanical

- Equipment Sizing and Selection
- Equipment layouts
- System design and evaluation
- Marine System Design
- Flow analysis
- Pipe Stress Analyses
- Drilling/Material Handling System Layout and Integration
- HVAC design and analysis
EOC Capabilities – Electrical

- Engine and Generator Sizing
- Circuit Breaker Coordination
- Electrical Load Analyses
- Harmonic Analysis
- Routing Plans
- System Integration
- Routing and arrangements
- Controls and instrumentation
- Safety systems
- Hazardous areas
EOC Capabilities - 3D Modeling and Design

- AVEVA Marine 3-D Modeling (PDMS, Tribon)
- 2-D and 3-D AutoCAD
- Inventor, Navisworks, 3-D Studio Max
- Detailed MTO’s and Clash Checking
- Fabrication Level drawings
EOC Capabilities – Drilling

- Rig Floor Layout and tubular handling:
  - Single/Multiple Well Centers
  - Simultaneous Ops/Offline Stand Building
  - Range 2 & 3 Pipe-Doubles, Trebles, Quads
  - Vertical & Horizontal DP & Riser
  - Layouts and integration, vendor interface

- BOP/Tree Handling
- Liquid Mud System Design
- Dual Gradient Drilling
- Monobore Drilling
- Expandable Casing
EOC Capabilities – Project Management

Project Management:
- Small projects (retrofit riser porch) to large (hull and topsides lead EPC)
- Engineering only to EPC

Regulatory Services:
- Plan review process from initial submission to final survey
- Regulatory Body Interface
Semisubmersible Deepwater Upgrades

Before Upgrade
Existing Vessel
Client’s Initial Concept
EOC Alternate Concept
EOC Alternate Concept 3
Final Concept
Vessel After Upgrade
Semisubmersible Deepwater Upgrades
Delta House FPS

- Lead hull and integration EPC

- Scope of work:
  - Hull design and construction supervision
  - Topsides lift and hull integration oversight
  - Riser porch design and adapter procurement
  - Riser installation procedures using FAST pull-in method
  - Weight Control for project

- Key Performance Metrics
  - On location in 34 months from engineering contract and within budget
  - Safety performance 0 LTIs for EOC scope
  - Achieved weight control goal of 900 MT reserve for future expansion
FE Analysis – Riser Adaptor

- A key element of novel FAST™ riser installation system

- Scope of Work
  - Combination of 2D shell and 3D solid elements
  - Contact surfaces Defined Between Bushing (master) and TSJ (slave)
  - Contact Constraints Were Defined at Supporting Pins of Adaptor
  - Loads Were Applied at Lower End of TSJ

- Key Performance Metrics
  - Key contribution to successful riser installations with zero incidents
  - Reduced installation schedule by 2 weeks
148 POB Living Quarters Module:

- Engineering and modeling of a living quarters module

Scope of Work

- Engineering: Electrical power, utility piping
- Design: power, safety, telecoms, utility piping
- Clash check: Structural back modelling and integration of all systems

Key Performance Metrics

- Accurately quantified materials
- Optimized routing for material use
- Minimized field-routing
Ensured suitable module sea transport plans for major LNG EPC project

Scope of Work
- Vessel motions for critical voyages
- Development and analysis of sea fastening plan
- Interaction analysis of modules and vessel
- Third party review of lift company engineering

Key Performance Metrics
- Zero incidents during transport related to sea fastening
Facility Weight Tracking and Control

- Full life cycle weight control – tracking and procedures

- Scope of work
  - Design estimates and weight planning
  - Fabrication weight tracking and control
  - Deadweight surveys and inclining tests
  - Post-delivery weight tracking and control service

- Key Performance Metrics
  - Unit delivered within 2% of pre-FEED estimated weight
  - Assisted client in avoidance of in-situ deadweight survey
The OPTI-EX ® Project in Pictures
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FAST™ Riser Pull In System-1
Do you have any questions?
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Thanks for your time!