DETAILED AND CONSTRUCTION SUPPORT ENGINEERING
PRE-QUALIFICATION DOCUMENT

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Contact Information

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<thead>
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<th>Contact</th>
<th>Company Position</th>
<th>Email Address</th>
</tr>
</thead>
<tbody>
<tr>
<td>Keith Jackson</td>
<td>Managing and Technical Director</td>
<td><a href="mailto:keith.jackson@offshore-ocs.com">keith.jackson@offshore-ocs.com</a></td>
</tr>
<tr>
<td>Seto Jian</td>
<td>Operations Manager</td>
<td><a href="mailto:setoj@offshore-ocs.com">setoj@offshore-ocs.com</a></td>
</tr>
<tr>
<td>William Wijaya</td>
<td>Project Manager</td>
<td><a href="mailto:william.wijaya@offshore-ocs.com">william.wijaya@offshore-ocs.com</a></td>
</tr>
<tr>
<td>Loke Kah Poh</td>
<td>Project Manager</td>
<td><a href="mailto:kplode@offshore-ocs.com">kplode@offshore-ocs.com</a></td>
</tr>
<tr>
<td>Rakul Remanan</td>
<td>Engineering Manager</td>
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</tr>
<tr>
<td>Alastair Wong</td>
<td>Construction &amp; Equipment Manager</td>
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</tr>
<tr>
<td>Fery Wijaya</td>
<td>Construction Manager</td>
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</tr>
<tr>
<td>Henry Chuy</td>
<td>Subcontracts &amp; Procurement Manager</td>
<td><a href="mailto:chuy.chunfei@offshore-ocs.com">chuy.chunfei@offshore-ocs.com</a></td>
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1. INTRODUCTION

Offshore Construction Specialists (OCS) was formed in 2007 to provide construction management, engineering and consulting services primarily to the offshore oil and gas sector. Changing industry dynamics have resulted in a shortage of properly qualified and motivated engineers with the right experience to deal with the range of complex issues faced by offshore operators and contractors. OCS employs a base load of personnel with extensive experience in all facets of marine construction. OCS uses this depth of experience to mentor and train new personnel and has built an organisation capable of taking on the most difficult projects.

To complement our Construction management, Operations and Field Engineering capability the Company has established a Detailed Design and Construction Support Engineering division equipped with the latest industry software.

On the detailed engineering side we provide a full design service for Jackets, Topsides, Pipelines and offloading facilities. This service is ideal for operators seeking to develop marginal fields where OCS can formulate engineering and installation strategies that are practical and cost effective. OCS will design structures configured for either installation by derrick barge or by jack up as an integrated effort with drilling operations where necessary.

For construction and installation our engineering group capability covers the complete range of analyses required for all marine projects including transportation studies, pipeline, flexible flowline and umbilical lay analyses, pile driveability studies, mooring analyses, engineered lifts, jacket launching, float and upend, and a range of other applications.

This document focuses on the services OCS provides in relation to Detailed Design and Construction support and detailed engineering.

OCS fills the gap that often exists between design engineering and operational constructability. To this end our design and construction support engineers liaise closely with their installation and construction counterparts to ensure the engineering is practical and fit for purpose in addition to being theoretically sound.

OCS is proactive in highlighting potential issues and the ultimate aim is to ensure both parties win.

OCS has now completed a range of projects for many different customers with great success. We are equipped to handle large projects or discrete project elements depending on the specific needs of the customer.

The company has grown steadily since incorporation and now employs 60 personnel of whom 28 are qualified engineers and naval architects.

OCS has purchased a facility in the Pioneer district of Singapore at Number 36 Kian Teck rd to accommodate the Company’s management, engineering and equipment groups. We intend to develop the facility to a best in class status in our field of operations to the mutual benefit of OCS and our clients.
2. OCS ORGANISATION CHART

<table>
<thead>
<tr>
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</table>
3. DETAILED AND CONSTRUCTION SUPPORT ENGINEERING ORGANISATION CHART

Rakul Remanan
Engineering Manager
Master in Structural Engineering
7 years McDermott, Dubai, 1 year Sapura Acergy, KL
With OCS since Sep 2008

Pravin Thorat
Lead Structural Engineer
Master in Structural Engineering
NPCC, Selber
With OCS since Mar 2009

Heryantho Yohanis Lembang
Lead Naval Architect
B Tech in Naval Architecture
Indonesia Class Society
With OCS since Mar 2010

OCS Designs Pvt Ltd, India

Chayutra Sriyaporn
Senior Drafting Supervisor
Bachelor in Architecture
19 years in different companies
With OCS since May 2010

Sudhakar S
Senior Structural Engineer
Master in Mechanical Engineering
With OCS since Nov 2010

Raditya Andy Kurniawan
Senior Structural Engineer
Master in Construction Engineering
With OCS since Apr 2012

Priya Panjirosa
Structural Engineer
Bachelor in Ocean Engineering
With OCS since Jul 2013

Kunahar Chakka
Senior Structural Engineer
Bachelor in Structural Engineering
With OCS since Jan 2016

Sadhasivam
Structural Engineer
Master in Structural Engineering
With OCS since Jul 2014

Pankaj Kumar
Structural Engineer
Bachelor in Civil Engineering
With OCS since Aug 2015

Taufan Siregar
Naval Architect
Bachelor in Ocean Engineer
With OCS since Sep 2012

Uday Sarathy
Lead Pipeline Engineer
Bachelor in Mechanical Engineering
With OCS since Sep 2011

Mohan Chand
Senior Pipeline Engineer
Bachelor in Mechanical Engineering
With OCS since Jul 2014

Karun Das
Bachelor in Mechanical Engineering
With OCS since May 2015

Sainul Abid Kanniyath
Naval Architect
Bachelor in Naval Architecture & Ship Building
With OCS since Aug 2013

Rahul Bara
Naval Architect
Bachelor in Ocean Engineering & Naval Architecture
With OCS since Mar 2016

Savoy Pazhem Thottathil
Naval Architect
Bachelor in Naval Architecture & Ship Building
With OCS since Aug 2013

Sainal Abdin Kanniyath
Naval Architect
Bachelor in Naval Architecture & Ship Building
With OCS since Aug 2013

Sainal Abdin Kanniyath
Naval Architect
Bachelor in Naval Architecture & Ship Building
With OCS since Aug 2013

Rahul Bara
Naval Architect
Bachelor in Ocean Engineering & Naval Architecture
With OCS since Mar 2016

Aryo Prakoso
Draftsman
Diploma III STE
10 years in different companies
With OCS since Dec 2011

Lawrence S Custodio
Senior Draftsman
Bachelor in Science in Civil Engineering
With OCS since 2016

Vinod Kumar
Draftsman
Diploma in Mechanical Engineering
With OCS since Dec 2011

Tukaram Govind Parab
Senior Draftsman
Bachelor in Engineering
With OCS since Aug 2015

Khaing Zar Aung
Draftsman
Bachelor in Engineering
With OCS since Aug 2015

Updated Apr 2017
4. ENGINEERING ACTIVITIES

OCS's experience embraces the full range of Detailed Design and Construction Support Engineering (CSE). The Engineering group has extensive experience in all areas of analyses and design related to Marine pipelines, Structures and associated facilities. The experience encompasses the full range of structural, naval architectural, pipelines and geotechnical disciplines. While the focus is on engineering analyses related to offshore oil and gas facilities, the OCS Engineering group can perform general engineering covering a range of construction activities.

5. DESIGN ENGINEERING

OCS Design Engineering team capability covers the full range of engineering required for the design of offshore facilities

5.1. Jacket and Topside Detailed Design.
The capability includes all pre-service and in-service analyses and designs, including:
- Jacket and Topside Load out Analysis
- Jacket and Topside Transportation Analysis
- Jacket and Topside Lifting Analysis
- Jacket Upending Analysis
- Jacket Launch Analysis
- Jacket and Topside Inplace Analysis
- Jacket and Topside Fatigue Analysis
- Jacket and Topside Seismic Analysis
- Push Over Analysis
- Float Over and Mating design
- All miscellaneous designs like boat landing, crown shims, transition piece design etc.
- Pile design – eigen value analysis for stick up

Software Used: SACS, STAAD Pro, STAAD Offshore, MathCAD worksheets

5.2. Pipeline Detailed Design.

- Pipeline Wall Thickness checks
- Cathodic protection design
- Route selection
- On bottom stability analysis
- Pipeline Global buckling analysis
- Span Analysis, Crossing design
- Bottom Roughness analysis
- Subsea Tee Protection design
- PLEM and PLET structural Design
- Pipeline MTO
- Pipeline Specifications

Software Used: Offpipe (Static and Dynamic), Offpipe Span module, Orca flex, Caesar II, Abacus, MathCAD worksheets
6. CONSTRUCTION SUPPORT ENGINEERING AREAS OF EXPERTISE

6.1. Structural Engineering

- Lift Engineering
- Rigging Designs
- Padeye design / checks
- Hook/ Prong checks
- Transportation / Jacket Launching / Upending Engineering
- Sea fastening Analyses/ designs
- Barge strength checks for transportation
- Jacket Launch, Lift and Upend Analyses.
- Pile Installation Checks
- Pile Stopper, stabbing guide Designs
- Pile Upending and Stick up Checks
- Barge Upgrades: Upgrade of marine construction barges to accommodate additional required structural or Pipelay capacity. Stinger upgrade or new build designs.
- Installation Aids design: Rigging Platform, Bumpers and guides, chaser frames, spreader bar/frame, lifting frames etc.

Software Used: SACS, STAAD Pro, STAAD Offshore, MathCAD worksheets

6.2. Pipeline Engineering

Pipeline Installation Analysis

- Static and Dynamic Lay Analysis
- Davit Lift Analysis
- Start-up and Lay down analysis : Incl. DMA start up, bow string start up
- Abandonment and Recovery Analysis
- Single Point Lift Analysis
- Pipeline Shifting Analysis
- Local Buckling Checks
- Beach Pull analysis
- Lay Sensitivity Analysis : Incl. stinger angle and tension sensitivity
- Weld Repair Analysis,
- Above water Tie-in analysis
- Pipeline lay fatigue analysis

Line Pipe Transportation

- Stacking Height Calculations
- Transportation Calculations and Sea fastening design

Installation aids and Miscellaneous Design Elements

- Start –up , Lay down and Pull heads design
- Beach Pull Hold Back Foundation Design
- Clamp design and bolt tension requirement check
- Concrete coating crushing strength and slipping check
- Coffer dam design
6.3. SURF Installation Engineering

Cable / Umbilical Installation Engineering
- Cable /Umbilical lay start up analysis inclusive of J Tube Pull Force Requirement
- Static Lay Analysis -Calculation of Lay Profile and Lay Tensions
- Dynamic Lay Analysis – Calculation of limiting environmental parameters
- Inline connector lay analysis
- Subsea end termination laydown analysis
- Fatigue Analysis

Flexible Hose (Downline) Deployment Analyses
- Static Analysis – Downline top tension and Catenary Calculations for Pre-connection and Post connection
- Static Analysis with Current – Top Tensions & Subsea end static Displacements prior to connection and downline catenaries for Various clash checks after connection
- Dynamic Analysis - Top tensions, Subsea Termination connection end force and Limiting Environmental parameters Calculation

Software Used: Orcaflex (Static and Dynamic), MathCAD worksheets

6.4. Naval Architectural Studies

Tow Analyses
- Stability Checks and Vessel Motion determination
- Towing System Evaluation incl. Bollard Pull Calculation

Engineered Lift Studies
- Calculation of Dynamic Applied Forces during lifting based on directional sea-states.
- Calculation of “Snatch” Loads during lifting and placement
- Lift movement amplitude calculations.

Mooring Analyses
- Calculations of mooring tensions in particular environmental criteria and checking of the capacity of mooring components with respect to applied tension and the determination of maximum allowable environmental criteria based on adopted mooring patterns.
- Determination of vessel excursion in certain sea-states.

Jacket Floatation and Upending Studies
- Assessment of Jacket configuration during various phases of upending
- Evaluation of jacket clearances with respect to the barge and the sea-bed
- Assessment of the requirement for jacket leg flooding during upending
- Evaluation of Sling Tensions and hook loads
- Jacket stability checks during upending, Sensitivity studies to investigate the effect of change in jacket weight and shift in COG
6.5. Geotechnical Engineering

Pile Drivability studies

- To determine the dynamic stresses on the pile during driving
- To check the adequacy of a hammer to drive the pile
- To optimize the pile sections to reduce the number of offshore splices

Software Used: GRL WEAP, MathCAD worksheets

6.6. FPSO/ FSO/ Mooring Installation Engineering

- FPSO/ FSO station Keeping analysis
- FPSO/ FSO station keeping during installation – Tug boat/ Bollard Pull requirement
- Chain Mooring installation studies
- Catenary calculation
- Force calculation on Mooring Tower

Software Used: MOSES, MathCAD worksheets
7. EXISTING AND PAST CLIENTS

OCS has built up a significant customer base during eight (9) years of operations. OCS past and present clients for the projects with engineering scope are listed below. References can be provided on request.

<table>
<thead>
<tr>
<th>No</th>
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<tbody>
<tr>
<td>1</td>
<td>Allseas</td>
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<td>Asia Petroleum Developments (Salamander) (Indonesia)</td>
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<td>3</td>
<td>Baker Hughes</td>
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<td>Boskalis</td>
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<td>5</td>
<td>Caspian Hydra Technologies (Russia)</td>
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<td>6</td>
<td>Chemi-Link Corporation (Dubai)</td>
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<td>7</td>
<td>Chevron (Thailand)</td>
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<td>8</td>
<td>CNOOC Offshore Oil Engineering Company (China)</td>
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<td>9</td>
<td>COPI (Conoco Philips Indonesia)</td>
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<td>10</td>
<td>Crowley maritime Corporation (USA)</td>
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<td>22</td>
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<td>50</td>
<td>Vietsovpetro (VSP) (Vietnam)</td>
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8. MAIN PROJECTS-COMPLETED AND ONGOING

<table>
<thead>
<tr>
<th>Project</th>
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<tbody>
<tr>
<td>1) Filanovskogo – Phase 2</td>
<td>Client: Caspian Hydra Technologies/ Lukoil</td>
</tr>
<tr>
<td>Utility barge conceptualisation</td>
<td>Utility Barge naval architectural design</td>
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<tr>
<td>Jacket Upending Analysis (2 nos)</td>
<td>Structures sea fastening design (2 nos)</td>
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<tr>
<td>Jacket and topside lift analysis (2 nos)</td>
<td>Installation Aids design report (2 nos)</td>
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2) Utility Barge : OCS UB01 Miss Pennie | Client :OCS |
| Utility barge conceptualisation | Utility Barge naval architectural design |
| Utility Barge equipment design | |

3) EPCI for MDA and MBH Field Development | Client : Pt Timas/ HCML |
| Jacket Upending Analysis (2 nos) | Structures transportation analysis (2 nos) |
| Jacket and topside lift analysis (2 nos) | Structures sea fastening design (2 nos) |
| Pile drivability (2 nos) | Installation Aids design report (2 nos) |

4) Baker Hughes | Client: Baker Hughes |
| Design check of hose deployment skid | Strengthening proposal for the hose deployment skid |
### 5) Project: PHE WMO
Client: Pt Timas/ Pertamina
(Ongoing)

- Jacket Upending Analysis
- Jacket and topside lift analysis
- Pile drivability
- Structures transportation analysis
- Structures sea fastening design
- Installation Aids design report

### 6) Project: EPC for Trunk Pipeline at Bin Omar Oil Field
Client: CHEMI-LINK, SOC Iraq
(ONGOING)

- On shore Pipeline detailed design
- Data sheet preparation
- MTO preparation
- Specification preparation
- Procurement assistance
- Civil work reports
- Electrical design, data sheets and specifications
- Launcher/ receiver design
- Instrument control design, including SCADA system
- Pipeline Process design

### 7) Project: Pipeline Subsidence rectification
Client: Mcconnell Dowell

- Stress analysis for the subsided/ sunken onshore pipeline
- Stress analysis for rectification of onshore pipeline subsidence

### 8) Project: Madura BD Field Development – T & I
Client: Timas/ Husky CNOOC Madura Limited

- Pipeline beach pull analysis
- Pipeline pre trenching analysis
- Trench slope stability checks
- Pre trenching barge sea fastening design
- Barge transportation analysis

### 9) Project: Baker Hughes
### Client: Baker Hughes

- Subsea sampling unit design
- Subsea sampling unit fabrication
- Clump weight design
- Clump weight fabrication

| 10) | Project: Chevron Wheatstone Project  
Client: Baker Hughes |
|-----|------------------------------------------------|
|     | Cyclonic loading check on equipment  
|     | Stability of equipment under cyclonic loading |

| 11) | Project: Jangkrik Complex Project  
Client: Saipem/ PT Timas |
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<tbody>
<tr>
<td></td>
<td>Pipeline Field Data Book</td>
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</table>

| 12) | Project: Mallikai Project- Package B  
Client: Technip |
|-----|-------------------------------------------------|
|     | Grout Bag design or free span correction  
|     | Sea fastening design of the free span correction spread |

| 13) | Project: Gorgon Upstream Pre-commissioning |
### 14) Project: Kitchen Lights Unit 3  
**Client:** Crowley Solution Pte Ltd  
- Pile Driving and drilling deck design  
- King Pile Subsea Template design  
- Installation Aids design  
- Installation engineering of all the above  
- Sea fastening design of all the above  

### 15) Project: Kirinskoye Umbilical Repair Project  
**Client:** MRTS, Russia  
**SCOPE**  
- SDU Recovery Analysis  
- Field Data book for Umbilical
### 16) Project: Cambodia Block A Wellhead Platform
**Client:** Krisenergy

**SCOPE**
- Conceptualisation and detailed design of the jacket and topside including
  - Jacket Transportation Analysis and design
  - Jacket lift analysis and Design
  - Jacket and topside In place Analysis and design
  - Pile design
  - Jacket and topside secondary steel design
  - Jacket and deck fatigue analysis
  - Primary steel drawings
  - Primary Steel MTO

### 17) Project: Badamyar project
**Client:** Sapura Acergy/ Total E & P Myanmar

**SCOPE**
- Early engineering: Floatation and upending analysis of 3 Jackets.
  - Propose buoyancy tank geometry
  - Pile drivability analysis
  - Jacket and Topside transportation analysis
  - Jacket levelling frame design
  - Jacket Upending Analysis - 3 jackets

### 18) Project: Wheatstone SGS project
**Client:** Sapura Acergy (Australia) Pty Ltd (SAPLA)

**SCOPE**
- Bumpers and guides design for landing of buoyancy tank
- Sea fastening design of buoyancy tank

### 19) Project: Gorgon Upstream project
**Client:** Baker Hughes

**SCOPE**
- Injector Frame design
- Injector frame lift design (DNV 2.7-3)
- Coiled Tubing Deployment analysis
- Coiled tubing fatigue analysis
- Fabrication of Injector frame to DNV 2.7-3
<table>
<thead>
<tr>
<th>Project</th>
<th>Client</th>
<th>SCOPE</th>
</tr>
</thead>
</table>
| 20)     | kitchen Lights Unit 3 |Crowley Maritime Corporation  
- Design of Pile driving and drilling deck  
- Design of man riding basket |
| 21)     | Chevron Wheatstone Project |Baker Hughes  
- Seafastening design of flooding and de watering spread  
- Design of over boarding chute and work platform |
| 22)     | Banyu Urip – FSO and Mooring tower Installation |Rekhayasa/ Mobil Cepu  
- Station keeping analysis of FSO during installation  
- Force calculation on mooring tower during FSO installation  
- Bollard pull/ Tug requirement calculation during FSO installation |
| 23)     | Julimar Development Project |Baker Hughes |
SCOPE
- Seafastening design of flooding and de-watering spread
- Design of over boarding chute and work platform

24) Project: Wassana Wellhead Platform
Client: Krisenergy

SCOPE
Conceptualisation and detailed design of the jacket and topside including
- Jacket Transportation Analysis and design
- Jacket lift analysis and Design
- Jacket and topside In place Analysis and design
- Pile design
- Jacket and topside secondary steel design
- Jacket and deck fatigue analysis
- Primary steel drawings
- Primary Steel MTO

25) Project: NSRP Complex Project
Client: Zentech, SKEC, JGCS, NSRP (ONGOING)

SCOPE
Review of
- Pipeline
- All the pipeline detailed design documents incl.
- Pipeline design basis
- Route design report
- Wall thickness report
- Cathodic protection design report
- On-bottom stability analysis report
- End Expansion Analysis Report
- Free Span Analysis Report
- Upheaval Buckling analysis
- Spool Expansion analysis report
- Pipeline seismic analysis report
- MTO
- Specifications

Preparation
- Pipeline operating manuals
- Quantitative Risk Analysis Document
- Corrosion Management Plan
- Emergency Response Plan

26) Project: Banyu Urip – Pipeline Installation
Client: Rekayasa / Mobil Cepu
**SCOPE**

**Review of**
- Pipeline:
- Field Data Book
- RAO generation
- Beach pull analysis
- Naval Architectural:
  - Transportation analysis
  - Mooring analysis Pipeline Installation

**Design of**
- Cofferdam for beach pull
- Concrete sleepers

<table>
<thead>
<tr>
<th>Project</th>
<th>Client</th>
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<tbody>
<tr>
<td>Apache Julimar</td>
<td>Allseas / Apache</td>
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<tr>
<th>SCOPE</th>
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</thead>
<tbody>
<tr>
<td>Seafastening Design for PLETS</td>
</tr>
</tbody>
</table>

27) Project : Apache Julimar  
Client : Allseas / Apache

<table>
<thead>
<tr>
<th>Project</th>
<th>Client</th>
</tr>
</thead>
<tbody>
<tr>
<td>KGOC Gas and Condensate Export System</td>
<td>Essar / KGOC</td>
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</table>

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<tr>
<th>SCOPE</th>
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</thead>
<tbody>
<tr>
<td>Pipeline:</td>
</tr>
</tbody>
</table>
  - Field Data Book for 1 trunk line
  - Above water tie in analysis
  - Beach Pull Analysis
| Naval Architecture:      |
  - Mooring analysis
  - Anchor Pattern Drawings
  - Catenary drawings for anchor lines
| Structural:              |
  - Installation aids design |

28) Project : KGOC Gas and Condensate Export System  
Client : Essar / KGOC

<table>
<thead>
<tr>
<th>Project</th>
<th>Client</th>
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</thead>
<tbody>
<tr>
<td>Lampung LNG Floating Storage and Re gasification facilities</td>
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<th>SCOPE</th>
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<tbody>
<tr>
<td>Pipeline:</td>
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</tbody>
</table>

29) Project : Lampung LNG Floating Storage and Re gasification facilities
### Client: Rekayasa

**SCOPE**

**Pipeline:**
- Field Data Book preparation
- Davit lift analysis for riser installation
- Riser installation studies

### 30) Project: Bukit Tua Development Project  
Client: PT Timas Suplindo/ PC Ketapang -Petronas

**SCOPE**

**Pipeline:**
- Field Data Book for 3 nos infield pipelines and 1 export line
- 2 nos of above water tie in analysis
- Beach pull and Trenching Analysis
- Support analysis for HDD string pull

**Structural:**
- Jacket / Deck Lifting rigging design
- Pile drivability analysis
- Jacket and deck sea fastening analysis

**Naval Architectural:**
- Transportation analysis for jacket, deck and pipehaul
- Mooring analysis for Jacket/ Deck/ Pipeline Installation
- Jacket two block upend analysis

### 31) Project: PHE UL  
Client: PT Timas Suplindo / Pertamina Hulu Energi

**SCOPE**

**Pipeline:**
- Static and Dynamic Pipelay Analysis
- Field Data Book for infield pipeline

**Structural:**
- Jacket / Deck Lifting rigging design
- Pile drivability analysis
- Jacket and topside seafastening design

**Naval Architectural:**
- Transportation analysis of jacket and deck
- Pipe haul transportation analysis
- Mooring analysis for Jacket/ Deck/ Pipeline Installation
### 32) Project: Lima Subsidence Remediation Project
Client: PT Timas Suplindo / Pertamina EP

**SCOPE**

**Naval Architectural:**
- Mooring analysis for the hook up and accommodation support barges
- Review of all transportation analyses reports

---

### 33) Project: Jansz pipeline Installation
Client: IKM Testing Australia/ Allseas/ Chevron

**SCOPE**

- Design of reel, reel winder and tensioner support
- Design of horizontal chute
- Design of vertical chute support
- Fabrication of horizontal chute and modification of vertical chute

---

### 34) Project: Parigi Hot Tap
Client: PT Timas Suplindo / Pertamina EP

**SCOPE**

**Pipeline:**
- Pipeline Detailed design Verification incl
- Pipeline wall thickness check
- Pipeline stability analysis – concrete coating thickness check
- Pipeline bottom roughness analysis
- Pipeline span analysis
- Pipeline cathodic protection design
- Pipeline Installation Engineering incl
- Pipeline static / dynamic lay analysis
- Pipeline Field data book preparation

**Structural:**
- Design of subsea protection structures
- Design of Concrete sleepers

**Naval Architectural:**
- Mooring Analysis
- Transportation Analysis
35) Project: Mafumeira Project  
Client: Heerema Marine Contractor/ Chevron

<table>
<thead>
<tr>
<th>SCOPE</th>
<th>WHP SUL, WHP Centro, Tripod, Bridge and LQP Platforms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Structural:</td>
<td>Jacket, deck and bridge Sea fastening concepts</td>
</tr>
<tr>
<td></td>
<td>Jacket, Deck and Bridge Rigging design</td>
</tr>
</tbody>
</table>

36) Project: Gorgan project – Barrow Island LNG Plant  
Client: NorceSolstad/ Chevron

<table>
<thead>
<tr>
<th>SCOPE</th>
<th>113 numbers of lift installation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Naval Architectural:</td>
<td>Mooring analysis for Roadways and topside installations</td>
</tr>
<tr>
<td></td>
<td>Engineered lift study for Roadways and topside installations</td>
</tr>
</tbody>
</table>

37) Project: Zawtika Development Project, Phase 1A  
Client: L&T / PTTEP

<table>
<thead>
<tr>
<th>SCOPE</th>
<th>Structural:</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>Rigging design of 3 jackets and topsides</td>
</tr>
<tr>
<td></td>
<td>On bottom stability checks of 3 jackets</td>
</tr>
<tr>
<td>Naval Architectural</td>
<td>Upending analysis of 3 jackets</td>
</tr>
<tr>
<td></td>
<td>Launch and floatation analysis of 3 jackets</td>
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<tr>
<td></td>
<td>Pile launch and Upending Analysis</td>
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<tr>
<td></td>
<td>Mooring analysis</td>
</tr>
<tr>
<td>Geo-technical studies</td>
<td>Pile Drivability analysis of 3 jackets</td>
</tr>
<tr>
<td></td>
<td>Eigen Value Analysis for stick up calculations</td>
</tr>
<tr>
<td>Pipeline Engineering</td>
<td>Static and Dynamic Pipelay analysis</td>
</tr>
<tr>
<td></td>
<td>Field data Book</td>
</tr>
</tbody>
</table>
### 38) Project: Conversion of NandGaurav Barge to Pipelay Barge
**Client:** EOSL – Essar India

**SCOPE**

**Structural:**
- Complete design of the upgrade system, including foundation and strengthening for tensioners, winches, roller, pipe tunnel
- Complete design of stinger and stinger support A Frame and hitch

**Naval Architectural**
- Stability booklet for the barge

**Pipeline Engineering**
- Pipelay analysis for different pipe sizes

### 39) Project: QCLNG Upstream Project
**Client:** MCJV

**Pipeline:**
- Pipeline Pull Analysis
- Pull cable catenary checks
- Pipeline On Bottom stability checks during pulling
- Buoyancy calculations for the pull

**Structural**
- Design of Pull head

### 40) Project: Bawal Subsea Development
**Client:** TIMAS/ ConocoPhillips

**SCOPE**

**Pipeline:**
- Static and Dynamic Pipelay Analysis
- Abandonment and Recovery Analysis
- Start-Up and Lay down Analysis
- Weld Repair Analysis
- Local Buckling Checks

**Pipeline detailed design**
- Wall Thickness check
- Cathodic protection design
- Route selection
- On bottom stability analysis
- Span Analysis & Crossing design
- Bottom Roughness analysis
- Subsea Tee Protection design

**Structural**
- Installation Engineering, rigging design of Tee protection structure
- Sea fastening for pipe haul

**Naval Architectural**
- Tow / stability analysis – material barge (pipe haul and subsea structures)
### 41) Project: Gorgon Janz Offshore Pipelay
Client: Allseas / Chevron

**SCOPE**

**Structural:**
- Seafastening design for S mode PLETs
- Design for J mode PLETs
- Sea fastening Design for lay in PLETs
- Sea fastening Design for APS structures

---

### 42) Project: Yolla Mid Life Enhancement Project
Client: Origin Energy

**SCOPE**

**Structural:**
- Rigging design for Compressor (CM), Accommodation (AM) and Condensate modules
- Sea fastening designs for CM and AM modules
- Bumpers and Guides design
- Barge Strength check (HLV, Work barge and material barge)
- Gangway design
- Spreader frame and Spreader bar design

**Naval Architectural**
- Engineered Lift Study
- Extensive lift workability study using the available met ocean data and the Vessel (J 25) motion characteristics.
- Material barge stability analysis

---

### 43) Project: ArkatunDagi Field Development Project
Client: Heerema / Exxon Neftegas

**SCOPE**

**Structural**
- Spool Tunnel design.
- Spool and tunnel lifting spreader bar design
- Grillage and sea fastening design for tunnel and spool

**Naval Architectural**
- Engineered lift study
### 44) Project: Provision of Marine Construction Services in Gulf of Papua

**Client:** EMAS/Oil search

**SCOPE**

- **Structural**
  - PLEM installation rigging design
  - Sea fastening designs for pipe haul and subsea structures

- **Pipeline:**
  - Static and Dynamic Pipelay Analysis
  - Abandonment and Recovery Analysis
  - Start-Up and Lay down Analysis
  - Weld Repair Analysis
  - Local Buckling Checks
  - Pipeline Davit lift analysis (PLEM and Riser Stalk on)

- **Naval Architectural**
  - Tow stability analysis for material barge (pipe haul and subsea structures)

- **Geotechnical**
  - PLEM, Stabilization support and Anchor pile Drivability analysis

### 45) Project: TSB Development Project

**Client:** TIMAS/Kangean Energy Indonesia Limited

**SCOPE**

- **Pipeline:**
  - Static and Dynamic Pipelay Analysis
  - Abandonment and Recovery Analysis
  - Start-Up and Lay down Analysis
  - Weld Repair Analysis
  - Local Buckling Checks

- **Flexible pipeline/ Cable:**
  - Flexible Pipelay analysis
  - Cable lay analysis

- **Structural**
  - Installation Engineering of Riser base, Manifold and hot tap protection.
  - Sea fastening of pipehauls and the subsea structures

- **Naval Architectural**
  - Tow / stability analysis – material barge (pipe haul and subsea structures)

### 46) Project: Chevron 2011 campaign – Platforms and Pipeline Installation

**Client:** EMAS/Chevron

**SCOPE**

- **Structural**
  - Rigging design for deck and jacket installation

- **Naval Architectural**
  - Engineered lift study

- **Pipeline:**
  - Static and Dynamic Pipelay Analysis
  - Abandonment and Recovery Analysis
  - Start-Up and Lay down Analysis
  - Weld Repair Analysis
  - Local Buckling Checks
<table>
<thead>
<tr>
<th>Project</th>
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<td>PRP Platform Module Installation</td>
<td>Norce Offshore / Punj Lloyd/ PTSC</td>
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<tr>
<td>Saint Josephs Cable Replacement Project</td>
<td>TLO/ Shell Malaysia</td>
</tr>
<tr>
<td>Bokor Cable Installation</td>
<td>TLO/ Petronas</td>
</tr>
<tr>
<td>MHNRD II – 4 Whs</td>
<td>TLO/ L &amp; T / ONGC</td>
</tr>
<tr>
<td>MHN Project</td>
<td>L &amp; T / ONGC</td>
</tr>
</tbody>
</table>

**47) Project : PRP Platform Module Installation**

**Client : Norce Offshore / Punj Lloyd/ PTSC**

**SCOPE**

**Structural:**
- Rigging design for module installation
- Bumpers and Guides design
- Gangway design
- Spreader frame and Spreader bar design

**48) Project : Saint Josephs Cable Replacement Project**

**Client : TLO/ Shell Malaysia**

**49) Project : Bokor Cable Installation**

**Client : TLO/ Petronas**

**SCOPE**

**Cable:**
- Cable Lay analysis
- J tube pull analysis

**Structural:**
- Sea fastening check for cable reel

**50) Project : MHNRD II – 4 Whs**

**Client : TLO/ L & T / ONGC**

**SCOPE**

**Structural:**
- Lift rigging design, trunnion and padeye checks
- On bottom stability analysis and mud mat checks
- Pile stick up checks
- Conductor hang off study

**Naval Architectural**
- Jacket upending and floatation analysis

**Geotechnical**
- Pile drivability analysis
- Conductor drivability analysis

**51) Project : MHN Project**

**Client : L & T / ONGC**

**SCOPE :** Third party review of the installation engineering documents

**Structural:**
- Jacket In place analysis
- On-bottom stability and mud mat checks
- Start-Up and Lay down Analysis

**Naval Architectural**
- Launch analysis- Cable and Bridge
- Jacket upending and floatation analysis
52) Project: North Belut Project - Installation of cable and bridge  
Client: TIMAS/ Conoco Phillips

**SCOPE**

**Structural**
- Sea fastening design of cable and bridge
- Rigging design of bridge

**Naval Architectural**
- Tow / stability analysis – Material barge- Cable and Bridge

**Cable**
- Cable Lay Analysis

53) Project: Ujung Pangkah Platform Installation and Flowline EPCI. Phase -2  
Client: TIMAS/ Amerada HESS

**SCOPE**

**Structural**
- Jacket / Deck Lift rigging design
- sea fastening design - Jacket/ deck.
- Pile drivability analysis

**Naval Architectural**
- Tow / stability analysis – Jacket/ deck
- Mooring analysis for Jacket/ Deck Installation.
- Engineered Lift study

54) Project: Compressor Replacement Project - East Belumut  
Client: Newfield

**SCOPE**

**Structural**
- Design of Integration Skid
- Lift rigging design including spreader bar and lift point design

55) Project: POE- Giant -6 – Conversion to Pipelay Barge  
Client: Pioneer Offshore

**SCOPE**

**Conversion to pipelay barge , including**
- Pipe tunnel
- Read rack and monorails
- Tensioner and roller foundations
- Conveyor system
- Stinger and A Frame design
- Barge strength checks
### 56) Project: Transportation and Installation of FSO moorings and Riser for JDA B-17
Client: Franklin / M3ERGY JDA SDN BHD/ Carigali - PTTEPI

**SCOPE**

**Structural**
- Chaser pile
- Chaser frame
- Tensioner ramp
- Chain spreader bar
- Pile stopper
- Riser overboard chute
- Access Platform below turret
- Riser hang-off collar
- Chain Pull-in A Frame
- Chain Tensioning padeye

**Naval Architectural**
- Tow analysis and sea fastening design of piles

**Geotechnical**
- Pile Drivability Analysis

### 57) Project: EPCI – KG Gas Development Project- Kakap Field –West Natuna
Client: TIMAS/ Star Energy

**SCOPE**

**Pipeline:**
- Field Data Book for pipeline
- Bow string Start-up Analysis

**Structural**
- Sea fastening analysis/ Design for the pipe haul
- Umbilical Reel Sea fastening
- Spool Sea fastening analysis

**Naval Architectural**
- Mooring analysis for Riser and I Tube Installation
### 58) Project: Ujung Pangkah Platform Installation and Flowline EPCI. Phase -1
Client: TIMAS/ Amerada HESS

**SCOPE**

**Pipeline:**
- Field Data Book for 6”, 12” and 16” pipeline
- Transportation analysis and sea fastening design for pipe hauls.
- Pipelay Barge Mooring Analysis
- Davit lift / Riser Installation analysis.
- Innovative pipeline start-up analysis using two barge

**Structural**
- Jacket / Deck Lift rigging design
- sea fastening design - Jacket/ deck.
- Pile drivability analysis
- Deck Load out Analysis – Indicative study
- Installation Frame Design
- Chaser Frame design

**Naval Architectural**
- Tow / stability analysis – Jacket/ deck
- Mooring analysis for Jacket/ Deck Installation.
- Engineered Lift study – Jacket

### 59) Project: Kambuna Topsides, Risers and Pipeline Installation
Client: TIMAS / Asia Petroleum Development/ Pertamina

**SCOPE**

**Pipeline:**
- Field Data Book for 14” pipeline
- Above Water Tie –in Analysis for 14” pipeline
- Beach Pull Analysis for 14”Pipeline

**Structural**
- Deck Lifting rigging design
- Installation aids design for pipelay
- Beach Pull foundation Design
- Barge Upgrades-Stinger Design for POE-PL1
- Barge Upgrades-Ready Rack and mono rail design for POE-PL1
- Sea fastening analysis/ Design for the pipe haul
- Dredge barge modification

**Naval Architectural**
- Transportation analysis for pipe haul
9. ISO CERTIFICATION

Certificate of Registration

This certificate has been awarded to

Offshore Construction Specialists Pte Ltd
36 Kian Teck Road, Singapore 626781, Singapore

in recognition of the organization’s Quality Management System which complies with

ISO 9001:2015

The scope of activities covered by this certificate is defined below:

Provision of Project Management and Consultancy Services for Oil and Gas Construction Facilities

Certificate Number: 41575/W/0001/SA/En

Date of Issue: 05 November 2015

Issue No.: 1

Expiry Date: 05 November 2019

Issued by: [Signature]

On behalf of the Director
Certificate of Registration

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Certificate Number: 4167/6IC/0301/UK/En

Date of Issue: 06 November 2016

Date of Issue: 01 April 2017

Issue No: 2

Validity Date: 06 November 2019

Issued by: [Signature]

On behalf of the Schemes Manager

[Company logos]
10. NATA CERTIFICATION

![NATA Accredited Laboratory Certificate](image-url)

NATA ACCREDITED LABORATORY

National Association of Testing Authorities, Australia

(ABN 59 004 379 748)

has accredited

Offshore Construction Specialists Pte Ltd

Singapore

following demonstration of its technical competence to operate in accordance with

ISO/IEC 17025

This facility is accredited in the field of

MECHANICAL TESTING

for the tests, calibrations and measurements shown on the Scope of Accreditation

issued by NATA

Jennifer Evans
Chief Executive Officer

Date of issue: 25 August 2016
Date of accreditation: 15 July 2013
Accreditation number: 19122

NATA is Australia’s government-endorsed accreditor of laboratories, and a leader in accreditation internationally. NATA is a signatory to the International mutual recognition arrangements of the International Laboratory Accreditation Cooperation (ILAC) and the Asia Pacific Laboratory Accreditation Cooperation (APLAC).