SIGNIFICANT PROJECTS COMPLETED
**Project Description**

Five additional on-shore fields are been developed and the refined products (gas & Condensate) will be exported via offshore terminals.

The project including on-shore Gathering lines, Refining & Fractionating unit onshore Trunk lines, HDD at shore, 3 Submarine pipelines, 2 offshore Offloading Terminals including Process platform.

**ZEE’s Scope of Work**

- 3 Submarine Pipelines,
- Design of Process Platform,
- Design of Mooring Dolphins,
- Mooring Analysis,
  - Design of Mooring System including Anchor Piles.
- Model Testing of FPSO, Supervision,
- FPSO Mooring Handling System Design,
- Transporting and Installation Engineering.
HEERA REDEVELOPMENT PROJECT
OPERATOR – ONGC (India)
EPCC CONTRACTOR – Punj Lloyd (India)

Project Description
Heera Redevelopment project included the installation of 4 new Well-Head Platforms, 8 new Rigid Pipelines, 3 Flexi lines, 3 cables and modification to 7 existing platforms.
The project was executed via Sempec/ZEE office in Jakarta and the fabrication of the Platforms were carried in Kencana Yard in Lumut, Malaysia.

ZEE’s Scope of Work
• Design of the 4 new platforms,
• Modification of 7 existing platforms,
• Design of 8 rigid pipelines,
• Design of 3 flexi lines,
• Design of 3 cables,
• Construction supervision at Malaysian Yard,
• Transport and Installation Engineering.
RELOCATION OF TUBAN TERMINAL

OPERATOR – Petrochina Company Ltd (Indonesia)

Project Description
It was required to relocate the Crude Oil Offloading Facilities to deeper water to facilitate Offloading from larger tankers. The new terminal was relocated approximately 1.5km from the existing position. The project involved the installation of a new PLEM, submarine pipeline from existing PLEM to new PLEM, Installation (Mooring) of SPM and FSO.

ZEE’s Scope of Work
ZEE was asked to carry out FEED Study Detail Engineering and prepare the technical documents for RFQ. The study involved the design of
• Submarine Pipeline,
• New PLEM,
• Mooring Analysis,
  - Check the integrity of System and the design of Anchor Piles.
• Cost Estimation,
• Compiling Technical documents for RFQ.
ENHANCEMENT & REFURBISHMENT OF FPSO SEAGOOD

OPERATOR – Santos (Sampan) Pte Ltd (Indonesia)
FPSO PROVIDER – PT Pulau Kencana Raya (Indonesia) & Labroy (Singapore)

Project Description
Santos required an FPSO to operate in their fields in Indonesia. The Contract was awarded to PT Pulau Kencana Raya and Labroy. The proposed FPSO, SEAGOOD I was required to undergo major enhancements to meet with Santos specifications. To accommodate the 3 phase separation equipment the FPSO required to be jumbonized by 20meters.

The works were carried out In Labroy Shipyard in Batam.

ZEE’s Scope of Work
• To carry out facility design (Process, E&I)
• Naval Architecture including producing revised stability booklet, assisting in getting ABS Certification.
• Structural Engineering for deck strengthening and design of supports, walkways etc.
• Mooring design.
• Construction supervision at Batam Shipyard.
PIPELAY FIRING LINE DESIGN FOR 1000T DLB HAMIZAKU
PRINCIPAL DESIGN CONSULTANT – OME Synergy Sdn Bhd (Malaysia)

Project Description
A new DLB HAMIZAKU with 1000Ton Crane was to be built in Malaysia. The principal consultant to this project was OME Synergy Sdn Bhd.

ZEE’s Scope of Work
ZEE’s scope was to design the pipelay “firing line” including the floating stinger.
• Conceptual and detail engineering to achieve top cord curve and stinger configuration,
• Floating Design & Stability,
• Detail design,
• Hitching methodology,
• Hitch design,
• Barge deck strength design,
• Assisting in 3rd party certification.

OTHER STINGER DESIGNS COMPLETED
• DLB Enterprise III, TL Offshore (Malaysia)
• DLB KUBER, Punj Lloyd (India)
• DLB MAHESH, Punj Lloyd (India)
ARCO LL4A
OPERATOR – ARCO (Indonesia)

Project Description
ARCO was looking into ways of reducing pipeline installation costs specially for infield short lengths. In LL4A project ZEE proposed the Rentis Method. A pipeline bundle 8” & 4” was assembled on-shore. The length of the bundle was 2.1 km. The bundled was towed 65 km offshore and installed between 2 platforms.

ZEE’s Scope of Work
• Conceptual study,
• Detail Engineering,
  - Inplace Engineering
  - Installation Engineering
• Project management,
• Cost Estimation,
• Offshore Installation supervision.
RIG LEEN
OPERATOR – MANSAL OFFSHORE (Doha)

Project Description
Mansal Offshore wanted a self elevating Jack-up Rig for offshore support work in the GULF. As this Project was on fast track it was decided to convert a conventional 2,000 Ton DWT landing craft as the hull for the Jack-up Rig which was of length 60 meters, 32 meters wide and a draft of 4.8 meters. The rigs 4 legs each measured 75 meters enabling to work in water depth up to 50 meters.

ZEE’s Scope of Work
ZEE’s scope included the Detail Design including
• Naval Architecture, floatation stability,
• Structural design,
• Process and facility design,
• Mechanical Hydraulics,
• Fabrication supervision,
• Assistance in Project Management.

Concept design was carried out by Gusto Engineering (Netherland)
**EARLY PRODUCTION SYSTEM**

**OPERATOR – ARCO (Qatar)**

**RIG PROVIDER – Mansal Offshore (Doha)**

**Project Description**
Mansal Offshore was requested by ARCO (Qatar) to provide an Early Production System for 35,000 bbl/day output. The proposal by Mansal was a Rig at the Well Head with interconnected skid mounted process units, a pipeline to SBM and FPSO.

**ZEE’s Scope of Work**
- Conversion of Rig Muna Deck for the accommodation of the process units, piping, E&I,
- Structural Modification to Deck,
- Design of new Heli Deck,
- Design of Pipeline,
- Design of PLEM,
- Installation Engineering of SBM,
- Mooring Analysis – SBM, FPSO & Tanker.
Project Description
The overall objective of the Block B Subsea Development was to install facilities for the economic production of gas reserves from a number of reservoirs. This marginal field was developed in an optimized and efficient manner.

ZEE’s Scope of Work
• To carry out FEED Study of Subsea facilities including
  - Flow lines,
  - Subsea Controls,
  - Subsea manifolds,
  - Existing facilities modifications to Platform & FPSO.
• Compiling Specifications,
• Development of EPCC tender package.
MARGINAL FIELD DEVELOPMENT
OPERATOR – Repsol YPF Maxus

Project Description
Currently the company is developing marginal fields with a “guardian” monopod solution. A number of fields has been developed using this option. For future development the company is looking into a possible more efficient and cost effective solution.

ZEE’s Scope of Work
To carry out a conceptual study to provide an optimized solution for a typical marginal field development. Various development options were considered and cost models were completed for each option. Advantages/Disadvantages and cost benefits (CAPEX, OPEX) for each option was compared with the company marginal field philosophy.
Options compared were:-
- Braced Monopod
- Guyed Caisson
- Tripod
- Isolated well
- Template
- Remote Well
- Mini FSO
PLATFORM RECERTIFICATION
OPERATOR – REPSOL YPF Maxus

Project Description
The company has a number of platforms which has exceeded the design life. The company needs to keep these platforms operative, in some cases with enhancement for additional output. A structural integrity audit was to be carried out on these platforms for third party certification.

ZEE’s Scope of Work
• Carry out structural survey to establish “as it is” state,
• Build accurate model,
• Carry out standard analysis,
• If failure was encountered carry out push-over analysis to establish the reserve strength,
• Carry out fatigue analysis,
• If required carry out remedial engineering to make the platform fit for use,
• Lease with Certifying Authorities.

ZEE has completed approximately 35 Platforms.
20” TRUNK LINE, TMP TO GTS-A
OPERATOR – Total (Indonesia)
EPCC CONTRACTOR – PT Istana Karang Laut (Indonesia)

Project Description
As a part of an EPCC Contract, a 20” Pipeline needed to be installed from TMP to GTS-A platform. The pipeline routing is in swampy terrain in very shallow water.

ZEE’s Scope of Work
To carry out Detail and Installation Engineering.
• Detail Pipeline Design in Swampy Conditions,
• Detail Design of Converted Lay Barge (Flat Top Barge to Pipelay Mode),
• Installation Engineering,
• Construction and Installation Supervision.
Project Description
Kodeco Energy required Poleng Field which has been decommissioned to be activated and the operational life of the field to be extended. As a part of the rehabilitation process PLEM, SPM and an FPSO needed to be added for processing and offloading.

ZEE’s Scope of Work
ZEE scope included the multidisciplinary work related to rehabilitation.
• Structural integrity of the platforms and remedial engineering to bring the field fit for use condition,
• Process Simulation,
• Facility Design (E&I),
• Design of PLEM,
• Design appraisal of existing pipelines and the design of new lines,
• SBM & FPSO Mooring Design,
• Loading, Offloading Flexi hose design,
• Assisting company in getting Certification by third party.
PERTAMINA LIMA DECK RAISING PROJECT
OPERATOR – Pertamina (Indonesia)
EPPC CONTRACTOR – TIMAS

Project Description
Lima Filed Assets are approximately 30 years old. Due to the heavy extraction of Oil/Gas the complete field has subsided approximately 12 meters. PERTAMINA wishes to prolog the production life of the field and decide to carry out the lifting of the 4 platforms in the field simultaneously. This is the first time such a project has been undertaken.

Scope included the relocation of existing equipment, modify all piping and E&I works, Structural re-analysis and structural modification. The complete project was undertaken by Synergy / ZEE (JV Partners)

ZEE’s Scope of Work
• Structural modifications and re-analysis,
• Structural Integrity of the Hydraulic Jacking System,
• Local F.E. Analysis.
GG NEW FIELD DEVELOPMENT

OPERATOR – PHE ONWJ (Indonesia)
EPCC CONTRACTOR – PT MEINDO & PT SWIBER (Indonesia)

Project Description
GG New Field Development Project is a gas development strategically aimed at delivering gas to support PHE ONWJ Gas Sales and Purchase agreement to Costumer.

ZEE’s Scope of Work
• Loadout, Grillage and Seafastening Design
  • Topside
  • Jacket
  • Piles
• Barge Ballasting and Stability during Loadout
• Loadout Procedure
SMK3 NEW FIELD DEVELOPMENT

OPERATOR – TOTAL (Indonesia)
EPCC CONTRACTOR – PT MEINDO (Indonesia)

Project Description
The South Mahakam field is located approximately 35km to the south east of Balikpapan. The water depth ranges between 45 and 60 meters with 46.7 meters at location of Jumelai field. The JM1 platform consists of 3 legged conventional jacket (installed by lift) supporting minimum facility wellhead topside.

ZEE’s Scope of Work
- Loadout, Grillage and Seafastening Design
  - Topside
  - Jacket
  - Piles
  - Vent Boom
- Jacket Buoyancy Tanks Design
- Barge Ballasting and Stability during Loadout
- Loadout Procedure
KL GAS LIFT FIELD DEVELOPMENT

OPERATOR – PHE ONWJ (Indonesia)
EPCC CONTRACTOR – PT MEINDO (Indonesia)

Project Description
KLA flow station is one of the major gas producers in the PHE ONWJ area with a normal gas production of 40-60 MMSCFD and a normal crude oil production up to 4000 BOPD. The crude oil from KLA and KLB platforms are produced by using in-situ gas lift from gas source wells. The EPCI CONTRACT will consist of the engineering, procurement, construction, modification and installation in KL Field on existing COMPANY facilities.

ZEE’s Scope of Work
• In-service and Pre-service Analysis for Modification
  • KLA Platform
  • KLB Platform
  • KLC Platform
• Transportation and Installation Design
  • Flare Boom
  • Compressor Module
  • Stair Towers
  • Riser Guard
  • Deck Extensions
  • Helideck Removal
Project Description
Bangka Field is a deepwater gas field located in offshore East Kalimantan, Indonesia in 3200’ of water. The original hydrocarbon in place is 179.5 BSCF of gas and 2,766 MSTBO of condensate. The field will be developed with two well subsea completion, tie in the production to existing West Seno (WS) Floating Production Unit (FPU) through a new 9.5” ID Flexible Flow line. A new umbilical will be installed for remote subsea controls from the FPU. Modifications will be made to the existing WS FPU as a part of Bangka Topside Project for processing and handling of the Bangka gas and condensate.

ZEE’s Scope of Work
• Complete Hull Structure Modification (void tank conversion)
• Complete naval/Marine Engineering including FPU Motion, stability, longitudinal strength, mooring re-assessment etc.
• Assist Company for Class Approval (ABS)
INDONESIA DEEPWATER DEVELOPMENT
BANGKA TOPSIDE EPCI
OPERATOR – Chevron (Indonesia)
EPCC CONTRACTOR – PT MEINDO (Indonesia)
**Project Description**
Bangka Field is a deepwater gas field located in offshore East Kalimantan, Indonesia in 3200’ of water. The original hydrocarbon in place is 179.5 BSCF of gas and 2,766 MSTBO of condensate. The field will be developed with two well subsea completion, tie in the production to existing West Seno (WS) Floating Production Unit (FPU) through a new 9.5” ID Flexible Flow line. A new umbilical will be installed for remote subsea controls from the FPU. Modifications will be made to the existing WS FPU as a part of Bangka Topside Project for processing and handling of the Bangka gas and condensate.

**ZEE’s Scope of Work**
- 3D Finite Element Analysis Modification for
  - FPU Hull
  - Flexible and Umbilical Riser Support
  - Others Supports
- Fatigue Analysis for Modification
  - Living Quarter, Production & Utility Modules
  - Others Supports
INDONESIA DEEPWATER DEVELOPMENT
BANGKA TOPSIDE EPCI
OPERATOR – Chevron (Indonesia)
EPCC CONTRACTOR – PT MEINDO (Indonesia)

**ZEE’s Scope of Work (Cont’d)**

- FPU Global Performance Analysis
  - Motion Analysis
  - Stability Analysis
  - Mooring Analysis
- Towing Arrangements
- Bollards Design
- Transportation and Seafastening All Equipments
TRANSPORT AND INSTALLATION ENGINEERING
EPCC OPERATOR – Heerema Marine Contractors Nederland B.V.

Project Description
HMC requires T&I Engineering for International projects. HMC appointed ZEE as an Engineering Contractor to undertake T & I Engineering for various projects.

ZEE’s Scope of Work
• Dynamic Lift Analysis using HMC In-House LIFTDIN Software. Various Jacket & Topside heavy lifts were carried out,
• Jacket Launch Analysis (8,000 MT),
• Various Jacket Topside Piles Grillage and Seafastening Design,
• Mooring Analysis,
• Bollard Pull Analysis,
• Load out Ballasting Design.
MAFUMEIRA SUL

OPERATOR – CABGOC (Angola)
T&I CONTRACTOR – HMC (Singapore)

Project Description
The Mafumeira field is located off the Angolan coast within the CABGOC Block 0, in the southern portion of the concession Area A. CABGOC plans to provide additional platforms, infrastructure and facilities to develop the Mafumeira field through the Mafumeira Sul Project (MSP).

As the EPCI contractor for the MSP project, Daewoo Shipbuilding & Marine Engineering Co. Ltd. (DSME) has awarded the Transportation and Installation Contract to Heerema Marine Contractors (HMC).

ZEE’s Scope of Work
- Grillage and Seafastening Design
  - Flare Boom Jacket, Deck and Piles
  - LQP Jacket and Piles
  - WHP-C Jacket and Piles
  - WHP-Sul Jacket and Piles
SPM POLENG REPLACEMENT PROJECT

OPERATOR – PHE WEST MADURA OFFSHORE

Project Description
PT Pertamina Hulu Energi West Madura Offshore (PHE WMO) is the operator of the West Madura and Poleng asset located in offshore East Java. Floating Storage and Offloading (FSO) is connected to Single Point Mooring (SPM) as a final storage of the oil production from WMO Field. In the periodic time, the shuttle tanker picks up the oil from FSO and delivers to the customer.
SPM POLENG REPLACEMENT PROJECT
OPERATOR – PHE WEST MADURA OFFSHORE

- SPM Integrity Check
- Mooring System Integrity Check
- Mid-Arc Buoyancy Tank Modification
- PLEM Modification
- New Additional Submarine Hose Integrity Check
- Mooring Hawser Check

FSO
The scope of this project is to study and establish the limiting criteria for various shuttle tanker sizes.
Pertamina Hulu Energi West Madura Offshore (PHE WMO) the operator of the west Madura and Poleng assets located in offshore East Java plans to replace the existing SPM at Poleng field. In order to avoid lost of production due to shut down, the temporary mooring for approx. 30,000 DWT Tanker is required.
DESIGN OF TEMPORARY MOORING SYSTEM FOR 30,000 DWT TANKER PROJECT
OPERATOR – PHE WEST MADURA OFFSHORE
DESIGN OF TEMPORARY MOORING SYSTEM FOR 30,000 DWT TANKER PROJECT
OPERATOR – PHE WEST MADURA OFFSHORE
Project Description
Scope consist of 75000 cbm diesel storage terminal and dolphin mooring system at Sangatta, Kutai Timur, East Kalimantan, Indonesia including Pipeline, PLEM, Submarine Hose and Umbilical.

Subsea Hose In-Place and Installation Check
Complete Subsea Pipeline Design and Installation
PLEM Design and Installation Check
Umbilical Design and Installation Check
Complete Pipeline Design and Installation
KRA PROJECT

OPERATOR – STAR ENERGY

Project Description
Star Energy (Kakap) Ltd (Company) is developing the KAKAP Field which consist KG, KRA, KH, and KF field, located in West Natuna Sea, Indonesia. It is producing sales gas that is sold to Singapore through 14” pipeline that connects to the main West Natuna Transmission System (WNTS) pipeline. Company intends to further develop the field by adding two new infill wells, namely KRA-South 2 and 3, to be tied back to KRA Platform via subsea pipelines.
HOT TAP PROJECT

OPERATOR – PHE ONWJ

Project Description
The existing 24-inch MGL APNA-MMC was locally damaged at around subsea tee location from APND Platform due to dragged anchor. PHEONWJ intends to repair this local damage pipeline by using Hot Tap method in order to maintain continuous gas supply from APN to MIKE-MIKE.
BREASTING DOLPHIN PROJECT

OPERATOR – PETROCHINA

Tanker Motion Study

Breasting Dolphin Integrity Check
AAL DEVELOPMENT PROJECT
OPERATOR – SANTOS

FFSO Motion Study

- Flexible Jumper Dynamic Analysis
- Flexible Jumper Installation study
- Flexible Jumper Interference Analysis
AAL DEVELOPMENT PROJECT

OPERATOR – SANTOS
5 YEARS TRACK RECORD
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