MARGINAL FIELD PLATFORM
ZEEPod

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MALAYSIA | SINGAPORE | INDONESIA | SRI LANKA
1.0 MARGINAL FIELDS

Historically in the offshore development centres around the world, namely Gulf of Mexico, the North Sea and South China Sea, the largest fields have always been the first to be exploited. This has been mainly due to initial incentives put in place by various governments in attracting the industry as well as the inherent high rate of return due to the size and productivity of these large fields.

With the drop in oil prices in the late 70’s and the oil crash of 1986, the oil companies were forced to seek alternative strategies in keeping the industry alive and profitable. This was aided primarily by the development and introduction of new improved technologies. Certain initiatives such as CRINE (Cost Reduction Initiative for the New Era) in the North Sea and more recently CORAL (Cost Reduction Alliance) in the South East Asia, Have contributed towards more cordial strategies to improve the economy of oil and gas field developments. One important area has been the development of smaller fields “economically marginally profitable”, hence “Marginal Fields”.

A Marginal Field in economic term is defined as a field with a Rate of Return (ROR) less than the Minimum Rate of Return (MRR), i.e. negative profit margin. The MRR for a same field varies from operator to operator. The MRR is affected by fiscal parameters, such as cost of capital, risk factors and tax regimes as well as technical factors. Such fields are hardly economic or rather unattractive for conventional development.

Oil companies are currently trying to find concepts to reduce costs to minimize MRR and consequently make these fields economically feasible. Most of the marginal field developments are based on the “satellite principle”, which means that the existing production and transportation facilities vicinity of a Marginal Field are used so that the development costs are significantly reduced.

1.1 Marginal Fields

There are too many variables such as water depth, reservoir size, equipment requirements, environmental conditions, soil conditions to determine one specific Marginal Field concept that suits all conditions. In the last decade, a variety of concepts have been adopted for the development of shallow water Marginal Fields.

These include FPSOs, MOPUs and Jack-ups. These have the advantages such as;
1. Reduced CAPEX,
2. Rapid deployment,
3. Easy removable at the end of production period.

The disadvantages include;
1. Availability,
2. Short to medium term commitment
3. Cost
The FPSO, MOPU and Jack-up may be attractive for a single well head operation, but a fixed platform option will be an ideal solution for a field containing a number of production wells at various locations. This paper deals with a solution for a fixed platform for shallow water Marginal Field. There are a number of such patented structures in the market today namely monopods, modular design, Guyed Caisson, Braced leg, etc.

1.2 Reduction Of Costs
As the installation cost is approximately 50% of the total cost of the platform, the installation method must be given priority when the choice of the platform is formulated. The weight of the platform alone is not the prime cost contribution for the project. In certain instances, it may be advantageous to sacrifice the platform weight in order to achieve a low cost installation method.

The following factors have been identified as ways to reduce installation costs and consequently the total cost of a Marginal Field Development.

1. Use potentially cheaper, non-conventional installation equipment and offshore spreads,
2. Adopt designs for simplified fabrication methods,
3. Adopt simplified load-out and sea transportation methods,
4. Consider mob-demob costs,
5. Control offshore installation activity with a suitable contract strategy with the installation contractor.

1.3 Design Considerations for Marginal Field Platforms
In order to increase ROR, the following design considerations shall be considered when undertaking the design of a platform for Marginal Fields.
- The facilities must be designed for a short operational life which will depend on the reservoir capacity.
- The project execution from concept development to production must be short.
- The facility must be lightweight and low cost.
- The fabrication from a local yard using easily available material.
- Design must address low cost load out, sea fastening and transportation,
- Adopt innovative installation methods using locally available minimum cost spreads,
- The platform shall be un-manned, automated with simple operating philosophy.
- Increase competitive tendering process by selecting locally available standard equipment, fittings & structural members.

1.4 Objective
Generally, the offshore operations in this region are in shallow waters with a maximum water depth of approximately 60 meters. The objective of this report is to introduce a Well Head Platform system suited for this condition and beyond.
2.0 STRUCTURAL DESIGN OF ZEEPod

Each platform will be purpose designed to suit particular load and site conditions, which include the following:
- Soil,
- Environmental,
- Deck loads,
- Self-weight,
- Operational,
- Load out & transportation,
- Installation.

2.1 ZEEPod System

A typical General Arrangement of the ZEEPod for 55m WD and below is shown in Attachment 1 and typical General Arrangement of the ZEEPod for 56m WD and above is shown in Attachment 2.

The system mainly consists of a main Caisson supporting the deck structure with 2 Raker Piles driven via a sleeve taking the lateral loading. A subsea template shall be used for a deeper water depth (56m WD and above) to stabilise the structure. The deck can be multi levelled to suit the process and operational conditions. It can accommodate boat landings. The system can accommodate a number of conductors and risers.

2.2 ZEEPod System Components

The main components for ZEEPod System are Piles and the deck. The deck will depend on the Field design criteria with typical weights of 500 Ton. The supplementary components consists of Caisson Sleeve, Boat landing, Subsea template and attachments such as hand rails, ladders etc. All these components are of low weight, which will enable load out with minimum carnage capacity and easily transported on flat top barge or on the designated vessel for installation.

2.3 ZEEPod System Installation

The installation can be carried by a Crane Barge, Drilling Rig or with any vessel with adequate carnage. The prime cost driver for the platform will be the installation spread taking into consideration:
- Day rate
- Mob location
- Mob De-Mob costs
- Equipment
- Schedule

The installation sequence is shown in Attachment 3 for ZEEPod 55m WD and below and Attachment 4 for ZEEPod 56m WD and above.
2.4 **ZEEPod System Reliability**

The system, ZEEPod is simplicity in fabrication, transportation and installation making it technically sound, and economical to install and operate. It is a well proven system with over forty (40) such systems in operation in Indonesia waters and currently new Braced Monopods are been installed. Some of the existing platforms are:

**CNNOC Fields:**


Pertamina Hulu Energi West Madura Offshore - PHE WMO (Formally Kodeco Energy)

PHE-40K, PHE 32, PHE 23, PHE 38A, PHE 38B, PHE 39, PHE 54,

In 2015, ZEE with EPCC Contractor Pt Meindo Elang Indah is finalizing the Implementation of the following Braced Monopods for PHE WMO;

PHE 12, PHE 29, FSB, SP, KLB.

2.5 **ZEEPod System Advantages**

The ZEEpod System Advantages can be summarized as follows;
- Reliable tested,
- Overall cost effective,
- Simplified system to fabricate and to install,
- Competitive bidding,
- Rapid production,
- The main components can be pre procured and stored.

2.6 **Related Documents**

- ZEE-PMT-PCS-002 - ZEEPod Overview
ATTACHMENT 1

ZEEPod GENERAL ARRANGEMENT (55m WD and Below)
ATTACHMENT 2

ZEEPod GENERAL ARRANGEMENT (56m WD and Above)
ATTACHMENT 3

ZEEPod INSTALLATION SEQUENCE (55m WD and Below)
ATTACHMENT 4

ZEEPod INSTALLATION SEQUENCE (56m WD and Above)
Installation Sequence:

Step 7: Prepare for lifting sleeve.

Step 8: Lifting of sleeve and positioning.

Step 9: Lower sleeve and level.

Step 10: Raker pile lift and positioning.

Step 11: Install raker piles as per design sequence and group.

Step 12: Boat landing installation.