



PERTAMINA - PHE WMOEPCI 1 - CPP2 TOPSIDE UNDER CONSTRUCTION



**GUNANUSA**

**Head Office:**

Gunanusa Building  
Jalan Bendungan Hilir Raya 60  
Jakarta 10210 - Indonesia  
Phone : +62-21-5703329

**Fabrication Shop:**

Ds. Margasari, Kec. Pulo Ampel  
Kab. Serang - Banten 42455  
Phone : +62-254-5750088  
e-Mail : fabrication@gunanusa.co.id



Membangun *knowledge database* yang kedepannya diharapkan dapat menjadi referensi utama ilmu dan teknologi dibidang fasilitas produksi migas di Indonesia, serta referensi kondisi lokal untuk International Codes.

Mendorong para professional dan akademisi dibidang fasilitas produksi migas untuk menerbitkan karya dan pemikirannya sehingga kompetensi dan keahliannya terangkat ke permukaan dunia industri migas.

Menjalin jaringan keilmuan dan teknologi untuk mengembangkan industri nasional dibidang fasilitas produksi migas.

Mengangkat aktifitas sumberdaya pendukung industri infrastruktur migas ke permukaan.

Misi JURNAL IAFMI







## PHE WMO President / GM Testimony

Ir. Sri BUDIYANI

PT. Pertamina Hulu Energi West Madura Offshore (PHE WMO) assets consist of numerous Wellhead Platforms and Process Platforms in Offshore Madura Strait and one Onshore Receiving Facility (ORF) in Gresik, East Java. In line with the strong commitment by Government and Ministry of Mineral and Energy in particular, PHE WMO is currently working to develop several new potential fields in the Northern part of the concession, while continuing to develop new Platforms under POD Integrasi-1.

The development of POD Integrasi-1 is an important step forward to monetizing PHE WMO Block Concession as a strategic priority to increase oil and gas production. In order to achieve these objectives PHE WMO is constructing 3 platforms (2 Wellhead and 1 Process Platforms) under EPCI-1 Contract, with the target to increase oil production up to 3000 BOPD and gas production of 10 MMSCFD by 2017. Strategically, this will be followed by building more Platforms under EPCI-2 and EPCI-3 Contracts with the objectives to increase production of POD Integrasi-1 with target of 12,000 BOPD and 27 MMSCFD for oil and gas production respectively.

The EPCI-1 Project consisted of 2 units Wellhead Platforms, 1 unit Central Processing Platform and 19.5 km Subsea Pipeline in PHE West Madura Offshore areas. It was completed with significant challenges in the midst of oil and gas business crisis due to steep decline of oil price. With determination and integrity of all of our National Engineers and Team Leaders of Project Team, backed up by professionalism of all stakeholders in PHE WMO, the EPCI-1 project was able to be completed.

I would like to personally extend my thank you to the Consortium Contractor (PT. Timas Suplindo and PT Gunanusa Utama Fabricators) and all EPCI-1 Project Team for successfully executed the EPCI-1 Project with outstanding performance that the work has been completed safely, on time, on scope, meet the intended quality, and within the budget.

To complete the Project with 3.5 Million Man-hours (cumulative cod 15 February 2017) without incident was an outstanding achievement which deserve a special merit to all personnel involved. PHE WMO will strive to continue raising the bar on Safety standard even in the challenging period faced by all PSC's. The challenge to PHE WMO Management is the difficult decision to significantly streamlining the manpower which forces us to think harder on how to increase operation efficiency across the departments.

IAFMI as a professional institution in the oil and gas production facilities was born at the right moment to face the challenges in the industry. We are happy to share our success story in the IAFMI Journal, hopefully it can inspire oil and gas professionals and be a good lesson learned to be shared across the community. We expect in the near future that IAFMI be a professional partner to the GOI in providing breakthrough ideas and become partners with PSC's in Indonesia to provide technical advice or problem solving experts for PSC's needs in their respective working areas.

# PHE WMO EPCI-1 PROJECT

## “JOURNEY TO SUCCESS BEGINS WITH STANDARDIZATION”

Sandry Pasambuna, *Project Manager EPC 1, PHE WMO*

### ABSTRACT

**PT. Pertamina Hulu Energi West Madura Offshore (PHE WMO)** is a Production Sharing Contractor (PSC) of SKK Migas. As an operator for West Madura block offshore facilities, PHE WMO is currently having numerous Wellhead Platforms, 2 (two) Process Platforms (PPP and KE-5 CPP) and 1 (one) Onshore Receiving Facility (ORF) in Gresik. PHE WMO has discovered Oil and Gas at the Offshore Madura south area in the vicinity of existing KE-5 CPP in 2013 and the development plan was approved as part of POD Integrası-1. Execution of POD Integrası-1 is divided into two phases; Phase-1 (EPCI-1 and EPC-2) and Phase-2 (EPCI-3). The success story of EPCI-1 Project which was delivered ahead of schedule with no LTI in total 3,600,000 mhrs involved, the use of standardized design, timely decision making based on sound risks assessment, and a solid contractor-client work relationship.









Figure 4: PDMS Modeling of PHE-12, PHE-24 and CPP-2 Platforms

treatment. It will export crude oil that meets the requirement of crude oil transfer pumps and gas lift compression system, with maximum flowrate estimated at 12,000 BOPD for oil, 27 MMSCFD for gas and 10,000 BWPD for the processed water.

Front End Engineering Design (FEED) was carried out by PT Technip Indonesia, completed on 07 February 2014. The FEED result was used as the basis to develop the Execute AFE for EPCI-1. These AFE's was approved by SKK Migas on 23 July 2014.

**PROJECT EXECUTION PLAN AND CONTRACTING STRATEGY**

Project Execution Plan was initiated and performed referring to *Pertamina Upstream Development Way (PUDW)*. This means that interface and team member interaction is required since the beginning of the project. A clear accountability and responsibility on specific deliverables was developed at each stage to ensure a holistic input and review resulting in a high quality Project that meets Stakeholders expectations.

Project Contracting Strategy has been developed from the start of Pre-FEED / FEED stage, to select a qualified single EPCI Contractor who will be carrying out all facilities Greenfield and

Brownfield scope. The Company is responsible to procure Company's supplied materials (LJI) based on FEED data and the

Contractor is responsibility to procure balance materials including all bulk materials and consumables based on Detail Engineering results. This contracting strategy is one of PMT strategy to accelerate project execution stage to meet the target schedule completion date and to reduce interfaces and specific risks on fabrication and installation stage.

The Consortium Contractor divided the scope into two stages as follows;

• **Stage1**, Detailed Engineering, Procurement of balance materials and Construction/ Fabrication onshore by PT. Gunanusa Utama Fabricator (PTG) at PTG yard in Grenyang.

- Fabrication of Piles, Boat Landings, Conductors, Jackets, Topside Decks for 3 Platforms - PHE-12, PHE-24 and CPP-2.
- Fabrication of Bridge linked from existing KE-5 CPP to CPP-2
- Load out and sea fastening Piles, Boat Landings, Conductors, Jackets, Topside Decks for 3 (Three) Platforms: PHE-12, PHE-24 and CPP2.



Figure 5: CPP2 Topside (2300 MT) installation Method by HLV Hilling 3000

- Step 1: Lift off the topside from the Transportation Barge.
- Step 2: Release the Transportation Barge
- Step 3: HLV move toward CPP2 Jacket Position
- Step 4: Setting the CPP2 topside on the jacket

- Brownfield modification and hook-up work at KE-5 CPP offshore.
  - Assist Commissioning work and Start Up.
  - Dog-leg, Riser and Riser Clamp Installation (KE-5 CPP Platform)
  - Dog-leg & Riser Installation PHE-12 and PHE-24
  - Tie-In Spool Installation (@PHE-12, PHE-24, CPP2 and KE-5 CPP)
  - Pre-com. and assist commissioning work.
- **Stage2**, Detail Engineering, Procurement of balance materials and installation offshore by PT. Timas Suplindo (PTT)
- Platform Installation (Total 3 Platforms: PHE-12, PHE-24 and CPP2)
  - Pipeline Installation (Total 3 Pipelines: from PHE-12 to CPP2 (8"PL Production & 6"PL Gas injection) and from PHE-24 to existing KE-5 CPP (6"PL Production)

**PROJECT HSE ACHIEVEMENT**

Strong HSE Commitments from both Top Managements and Leadership of PHE WMO and Consortium Contractor (PTT&PTG) during Project Execution Phase (onshore fabrication and offshore installation) on "Safe & Reliable Operation" has



Figure 6: Fig. 6 EPCI-1 HSE Performance and Achievement





Figure 7 | Target of EPCI-1 Project HSE referred to Project Dept. NGE KPI 2015

gave an extraordinary impact and result on EPCI-1 Project HSE achievement.

Top management has provided visible ongoing commitment and leadership for implementing process safety management, safety motivating force and controlling activities within the project organisation. PMT must act as a role model for how all project workforces should work to create a safe work environment. In achieving Project HSE KPI's, the Project HSE Team has provided Project HSE Plan to meet each of PUOW stage requirements.

To achieve HSE KPI targets, Project HSE team has developed the following HSE programs as leading indicators:

- Leadership and Commitment
- HSE Communication and Meeting
- HSE Inspection and Audit
- Hazard Identification Risk Assessment Determination Control Program (HIRADC)
- Training and Competency
- Emergency Response Preparedness

## ENGINEERING STRATEGY

Detail Design Engineering is the most critical part at EPCI execution stage. This exposes the project to the risk of major issues in Procurement, Construction, Installation and eventually

commissioning and start up. The Design of new WHP Platform (PHE-12 and PHE-24) and Proses Platform CPP2 are **typical standard design platform refer to the existing WHP and CPP1 Platform**. It gave an advantage and is extraordinary helpful to accelerate overall engineering progress (development, review cycle and approval of engineering documents), and it is also one of the key success to deliver EPCI-1 project on time.

To manage engineering execution and ensure all deliverables across all engineering discipline are delivered as per the Company's requirement, an Engineering Management Plan was developed. This includes engineering scope for design, verification and validation of engineering document, management of change, engineering organization and schedule. Having to consider tight schedule, the Engineering Management Plan focus on:

- Early Engineering to procure Long Lead Item identified during FEED
- Timely delivery of Detail Design Engineering deliverables as per target date; the strategy is co-location of Company and Contractor Engineers in one office to foster seamless communication and review process.
- Accelerate proses review documents by setting up workshops for internal discipline check, workshops with Contractor Engineering team

for major technical issue, workshops HAZOP/HAZID/SIL, and PDMS review. The detail design engineering was completed 3% ahead of baseline schedule.

## PROCUREMENT STRATEGY

The procurement of EPCI-1 material is divided into two categories;

- Long Lead Items (LLI) / free issued materials provided by PHE WMO
- Balance materials provided by Consortium Contractor.

FEED EPCI-1 was developed referring to a standardized design wellhead and CPP platform. This has given an advantage to PHE WMO PMT to take an early and timely decision to proceed with procurement of LLI (material that are taking more than 6 months delivery time). Examples of the LLI materials are: caisson and tubulars for the structure, and the linepipe materials. This early procurement strategy allows EPCI Contractor to start the onshore fabrication early by cutting the 1st steel in September 2015, 1 month after the EPCI contract was signed. This is a tremendous advantages that ensures entire project timely completion.

## ONSHORE CONSTRUCTION / FABRICATION

PT. Gunanusa Utama Fabricators (PTG) is one of the world-class contractors in the construction services for Onshore and Offshore Oil and Gas Production Facilities. In this project PTG has successfully completed fabrication of 3 (three) Wellhead Platforms and 1 (one) Bridge PHE-WMO at PTG Yard Grehyang.

First cutting of pipe materials for PHE-12 and PHE-24 Platforms commenced on 15 September 2015, followed by the first cutting of pipe materials for CPP-2 Platform on 2 October 2015.

The following are construction strategy and method employed during Onshore fabrication:

- The PHE-12, PHE-24 Deck was transported to barge by using Multi-wheel method while the CPP2 Deck used skidding method.
- Construction Engineering Department supported Fabrication Department by issuing pertinent documents such as: shop drawing, MTO, cutting instruction and template as necessary. Such documents were also issued in parallel to QC Department and Company.
- Design drawings from engineering company, fabrication and erection area plan, manpower plan, material arrival, NDE plan, weld map, inspection and test plan, availability of tools,

Platform	Structure	Weight	Fabrication
PHE-24	Jacket/Piles	252 MT	4 Months
	Topside Deck	356 MT	5 Months
PHE-12	Jacket/Piles	256 MT	4 Months
	Topside Deck	535 MT	6 Months
CPP2	Jacket/Piles	1,131 MT	6 Months
	Topside Deck	2,283 MT	10 Months

Figure 8 | Onshore Fabrication Duration

Platform, Pipelines Installation And Hook-up Work	Work Schedules	Completion Date	Actual Work	Marine Spread
<b>PIPELINES INSTALLATION</b>				
• 8" PL PHE12 - CPP2, 7.4 KM Length	12 Days	6 - 17 Sep 2016	12 Days	HLV Hlong 3000
• 6" PL PHE12 - CPP2, 7.4 KM Length	9 Days	20 - 29 Sep 2016	6 Days	
• 6" PL PHE5 - PHE24, 4.2 KM Length	6 Days	27 Sep - 01 Oct 2016	6 Days	
<b>PLATFORM INSTALLATION</b>				
• PHE24 Platform Inst	10 Days	5 - 14 Oct 2016	10 Days	HLV Hlong 3000
• PHE12 Platform Inst	10 Days	15 - 24 Oct 2016	10 Days	
• CPP2 Platform Inst. (incl. Flare & Bridge)	12 Days	26 Oct - 06 Nov 2016	12 Days	
<b>RISER SPOOL TIE-IN INSTALLATION</b>				
• 8" & 6" Spool PHE12	8 Days	28 Oct - 3 Nov 2016	7 Days	DLB-01
• 6" Spool PHE24	6 Days	4 - 6 Nov 2016	3 Days	
• 8" & 6" Spool CPP2 & Hydrtest	13 Days	07 - 14 Nov 2016	12 Days	
• 6" Spool PHE5, 6" Riser Guard & Hydrtest	9 Days	15 - 18 Nov 2016	4 Days	
<b>KE-S CPP MODIFICATION &amp; HOOK-UP WORK</b>				
• Fabricated and installed new Piping lines included Tie-ins, modification of Structural, Electrical, Instrument and Telecom.	Total Shutdown 7 Days	7 - 19 December 2016	12 Days	AWB Englisher

Figure 9 : Offshore installation campaign

equipment, and consumables were tightly monitored prior to work execution and during the work execution to allow accurate progress update and schedule resource levelling.

- Fabrication activities were carried out inside shop area and in open area.

- Regular briefing was conducted to make sure that fabrication and erection works were performed in accordance with the approved procedure and in a safe manner.
- Specific risk assessment was developed and used as guidance during safety toolbox.

QUALITY PERFORMANCE	TARGET	ACHIEVEMENT	
Minimum Welding Repair/Re-work	Structural - Fabrication (Yard)	Max. 3 %	0.006 %
	Structural - Installation (Offshore)	Max. 3 %	0.11 %
	Pipeline Installation	Max. 3 %	1.77 %
	Piping Works	Max. 3 %	0.054 %
Quality Audit on Project Cycle Based on Audit Plan	Min. 2 times	3 Times	
Total Finding During Quality Audit	Max. 1 Major Finding	NO Major Finding	

Figure 10 : Project Quality Performance

## OFFSHORE MOBILIZATION AND INSTALLATION

PT. Timas Suplindo (PTT) is one of the world-class in Installation services for offshore Platforms and Pipelines in the Oil & Gas market. In this project PTT has successfully completed installed 3 (three) Wellhead Platforms, 3 (three) lines of Pipelines and one linked Bridge between two processes Platforms.

Offshore Mobilization Readiness has been evaluated based on readiness of the following key items prior to start mobilization activities:

- Pre-mobilization Document Checklist Approval including all permits for marine spread
- Site Survey result
- Marine Spread inspection and readiness
- Construction and Installation drawing/ procedures/ calculation/ analysis approval (in AFC status)
- Approved detailed and thorough Project Execution Plan

## QUALITY TARGET & PERFORMANCE

The following Quality Programme(s) have been successfully implemented during the execution of

project in order to achieve the quality targets and goals:

- Very good team work between Company and Contractor Quality Team.
- Regular QA/QC Meetings between Company and Contractor Quality Team.
- All of Procedures were followed in accordance with the corporate and/or project specific quality procedures as shown in the Quality Plan.
- Quality activities were carried out as per the Inspection and Test Plans and as per the matrix shown in the Quality Plan.

Overall project quality target and goals was achieved during the course of EPCI: PHE12, PHE24 & CPP2 Platforms and Pipeline Project.

## PROJECT CONTROL, COORDINATION AND MONITORING

During project execution phase, the PMT has been able to manage project objectives and expectations within project boundaries. The following principles were the focus of each project team members:

- **Scope/Quality:** No major scope change



Figure 11 : EPCI-1 Project Management Integration Overview



during execution stage, clear deliverables on each stage, focus on project requirement and stakeholder expectation and more robust assurance process.

- **Cost/Resources:** Integrated multi discipline approach, accurate cost estimation, effective organisation, continuous learning and improvement and early involvement of internal audit to monitor the execution process.
- **Schedule / Time:** Prompt timing for people deployment, smooth fabrication and installation process, smooth pre-commissioning and commissioning activities, active project risk management in the form of regular evaluation basis and minimisation of uncertainty against schedule delivery.

EPCI-1 Project was initiated and performed by

allowing people to work efficiently as a team. Communication amongst team members and Consortia were developed during daily, weekly & monthly meetings, team building, and workshops.

### PROJECT SUMMARY ACHIEVEMENT

EPCI-1 AFE's were approved by SKKMigas in Q3-2014, when the oil price level was in the range of USD100/bbl but when the project started in Q3-2015 the oil price declined significantly to around USD50/bbl and this situation affected to all projects under KKKS. While other projects being cancelled or suspended, PHE WMO EPCI-1 Project continues with serious challenges. Due to Pertamina Corporate demand and inquiries with regard to the economics of the EPCI-1 Project, PHE WMO Management has to adapt and move swiftly to safe the Company interest of future oil and

WMO stake holders (SCM, Legal and Finance Departments) managed to convince Contractor, to second time renegotiate the contract 8 (eight) months after the project was awarded, and Contractor finally agreed to adjust for reduction from original Contract value without compromising on the Scope nor Specifications and Safety of the original Contract requirements.

Fabrication and installation of PHE-12, PHE-24 and CPP2 Platforms and Pipelines have been completed at the end of December 2016 and continued with commissioning and preparation for start-up, while waiting for drilling well completion on Q1 2017.

Overall project progress as of end of January is 94.96% vs 94.09% planned progress and is estimated to arrive on or slightly below approved budget. This was a tremendous accomplishment both for the PHE WMO and the Contractors given the current situation of low oil price which have brought impact to oil and gas new projects. The key factors contributing to project success are:

- Use of standardised design for the wellhead platform and Central Processing Platform (CPP) allowing early Long Lead Item (LLI)

identification and a focus FEED and Detail Engineering Design with minimum design changes.

- Co-location of PMT and EPCI Contractor engineering office allowing timely review of engineering deliverables and collaborative working environment
- Early procurement of LLI by Company ahead of EPCI tender, based on FEED results allowing early arrival of the LLI and expedites starts of onshore fabrication at site.
- Procurement of remaining balance materials based on Detail Engineering and progressive MTO completion
- Strong Company & Contractor HSE commitment through involvement of PHE WMO & Consortium Top Managements on the HSE campaign and regular walk through at fabrication site.
- Working as one integrated team between PMT, EPCI Consortia, Internal and External Auditor and SKK Migas from early stage of the Project ensuring project stays within the regulation boundaries.



Figure 12 : Project Timeline

a collaborative effort of multidiscipline in each stage of project life cycle. This mean Interface and interrelation amongst team members are required since beginning of the project. A clear accountability and responsibility on specific deliverables has been developed at each stage.

A communication strategy was put in place

gas production. A decision was then made after obtaining approval by PHE Management, which is to invite the Consortium of EPCI-1 Contractor to negotiate the Contract of EPCI-1 Project during tender process.

Project Team supported by other PHE

### ABOUT THE AUTHOR



#### Sandry Pasambuna

With more than 20 years outstanding work experienced in both national and international construction projects related to the Mining and Oil & Gas industries. Sandry spent his career managing large & complex projects in worldwide Oil and Gas Companies including Total E&P Indonesia, Mobil Cepu Limited (Exxonmobil Oil Indonesia), Kodeco Energy and currently working with Pertamina Hulu Energy (PHE), therefore he is very familiar with the wide range of Project Management and Construction methodologies of Onshore, Swamp and Offshore Projects. Currently Sandry is assigned as a Single Point Accountability (SPA) for EPCI-1 Project, in several new Project developments (Green Field) and existing facilities (Brown Field)

with PHE in the West Madura Offshore field. In those projects Sandry has lead and managed the projects successfully from Appraise, Select, Define, Execute (up to start-up), Hand Over (to the Operation) and Close-Out the projects. Sandry holds a Bachelor degree obtained in Civil Engineering from Sam Ratulangi University and a degree in the Specialist Environmental & Project Management from The Van Hall Instituut, The Netherlands. He is currently active as member of IAFMI Expert Board.



### PT GUNANUSA UTAMA FABRICATORS - TESTIMONY

Assalamu'alaikum warohmatullahi wabarakatuh.

Praise to Allah SWT of Whom has bestowed on us all, so that we Consortium - PT. TIMAS Suplindo and PT. Gunanusa Utama Fabricators as Contractor - has completely delivered two (2) new Wellhead Platforms: PHE24, PHE12 and one (1) Process Platform CPP2 including connecting pipelines, and brownfield modifications at KE-5 CPP offshore. A Total of more than 3.5 million manhours spent without Lost Time Incident (LTI).

It is a great honor for the Consortium especially PT. Gunanusa to be entrusted with constructing platforms PHE-12, PHE-24, CPP2 and brownfield modifications on KE-5 CPP. The Letter of Award (LOA) was given to the consortium on 4th August 2015 followed by signing of the contract on 14th August 2015.

Despite several challenges encountered during execution of the fabrication work, it did not hamper our determination to complete this project and present the best results for PHEWMO in particular, and to the country in general. A lot of valuable lesson was learned during execution of the work. Seamless process both in safety and quality during Engineering, Procurement, Construction, Installation, Precommissioning and Commissioning could not be separated from the active involvement of the PHE WMO as Company that go hand-in-hand with the Contractor. We also received great support from MIGAS and Custom who played an important role in making this project a success.

Currently we are putting our best effort to support Company for immediate start-up of CPP2 and PHE12 without compromising the safety and quality aspect of the project. Together, Company and Contractor have succeeded in delivering this project within the given project time frame, meeting the quality and with excellent safety record. As a contractor we feel very proud to be part of PHEWMO success story, and also the Republic of Indonesia.

It is our hope that PHE WMO will continue to success in many years to come and be able to prosper the welfare of Indonesian people in general.

Wassalamu'alaikum warahmatullahi wabarakatuh

**Eddy Rijanto**  
President Director

*"We Are World Class In What We Do"*

