

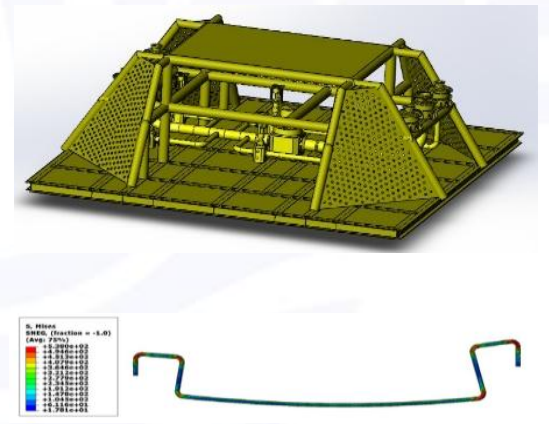
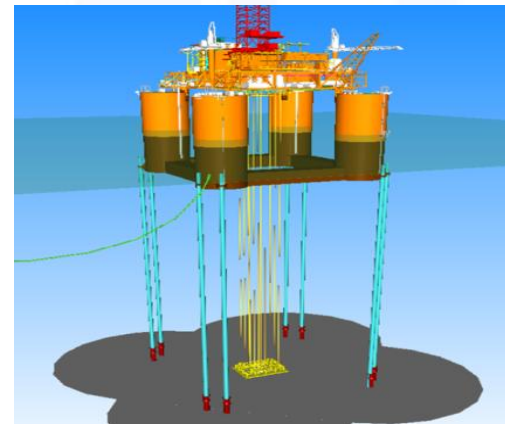
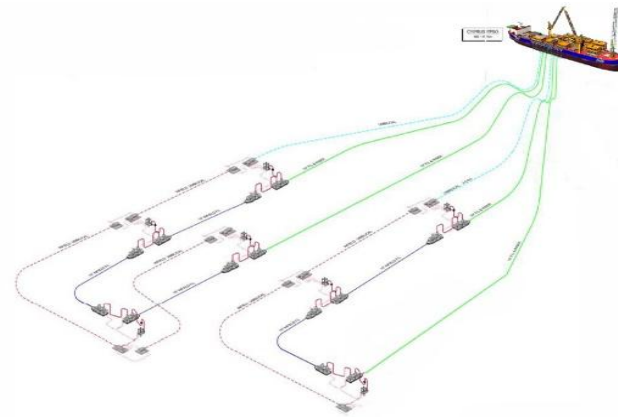
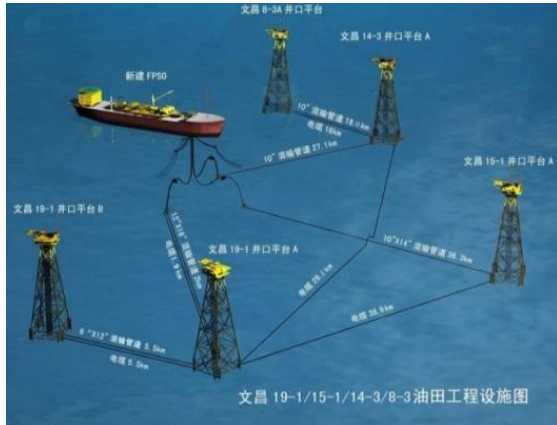
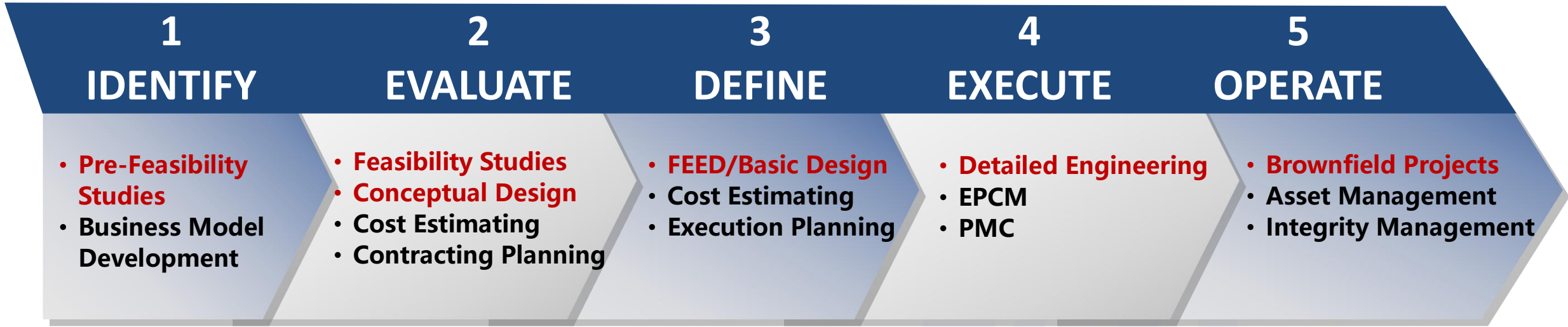
Deepwater Oil&Gas Development Solution Floaters



COOEC has successfully established a comprehensive technology system with proprietary intellectual property rights, creating the "China Solution" for deepwater oil and gas field development, and showing its significant advantages and strengths. COOEC possesses an advanced and reliable complete technology system for the development, production, and operational maintenance. COOEC has mastered the design technologies for ship-shaped and cylindrical FPSOs, TLPs, and semi-submersible production and storage platforms. COOEC also owns 4 outstanding fabrication yards, and has a professional offshore construction fleet of 19 vessels in 6 types, providing integrated solutions for ultra-deepwater oil and gas field development at depths of up to 1,500+m. After the successful validation of P67/70, "HYSH119" FPSO, Penguin FPSO, "Deep Sea No. 1" , "Haikui No. 1" FPSO, COOEC is steadfastly advancing towards deeper marine zones.



FULL LIFE CYCLE ENGINEERING SERVICES





- **Domestic standards:** GB, Q/HS, SYT, CCS, etc.
- **International standards:** ISO, API, ASME/ANSI, AWS, IEC, ASTM, SOLAS, etc.
- **Enterprise standards:** Shell DEP Standard, Russian Gost Standard, QatarEnergy Enterprise Standard , Canadian CSA standards, Nexen Enterprise Standards, etc.
- **Third party authority certifications:** DNV, ABS, BV.

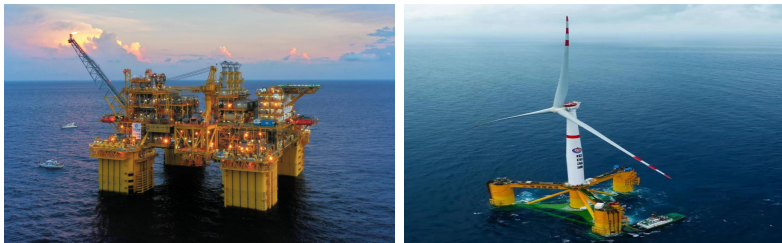


COOEC has basically developed the engineering, construction, installation and commissioning technologies of deepwater floating production facilities. Mastered the key technology and equipment of Semi, Ship Pattern & Cylinder FPSO, Internal Turret SPM based on “Deep Sea No.1”, “Haikui No.1”, “HYSY119” FPSO, Penguin FPSO and P67/70 FPSO.

SEMI

Design and technology system of semi submersible production platform

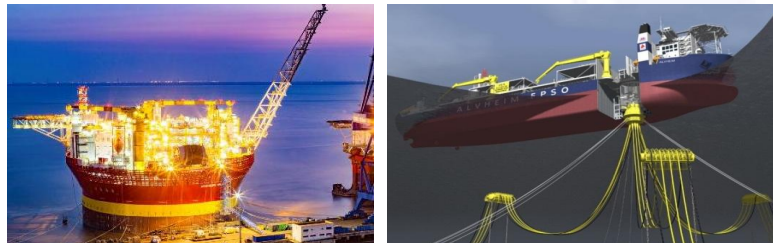
- Overall design of semi-submersible platforms
- Deep water polyester mooring system design
- Deep water steel catenary riser (SCR) systems design
- Fatigue design and inspection technology (30y undocking)
- Mating technology of ultra large structure



FPSO

Design and technology system of ship pattern and cylinder FPSO

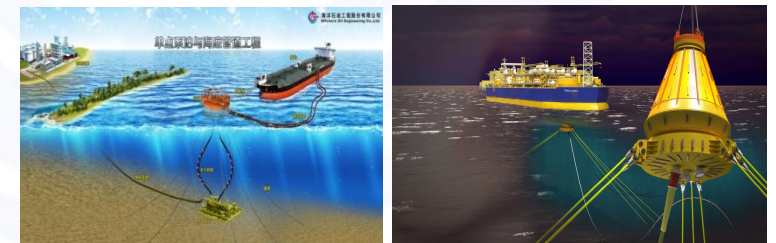
- Ship pattern and Cylinder FPSO overall design technology
- Taut mooring system design
- Integrated design technology for hull and topside



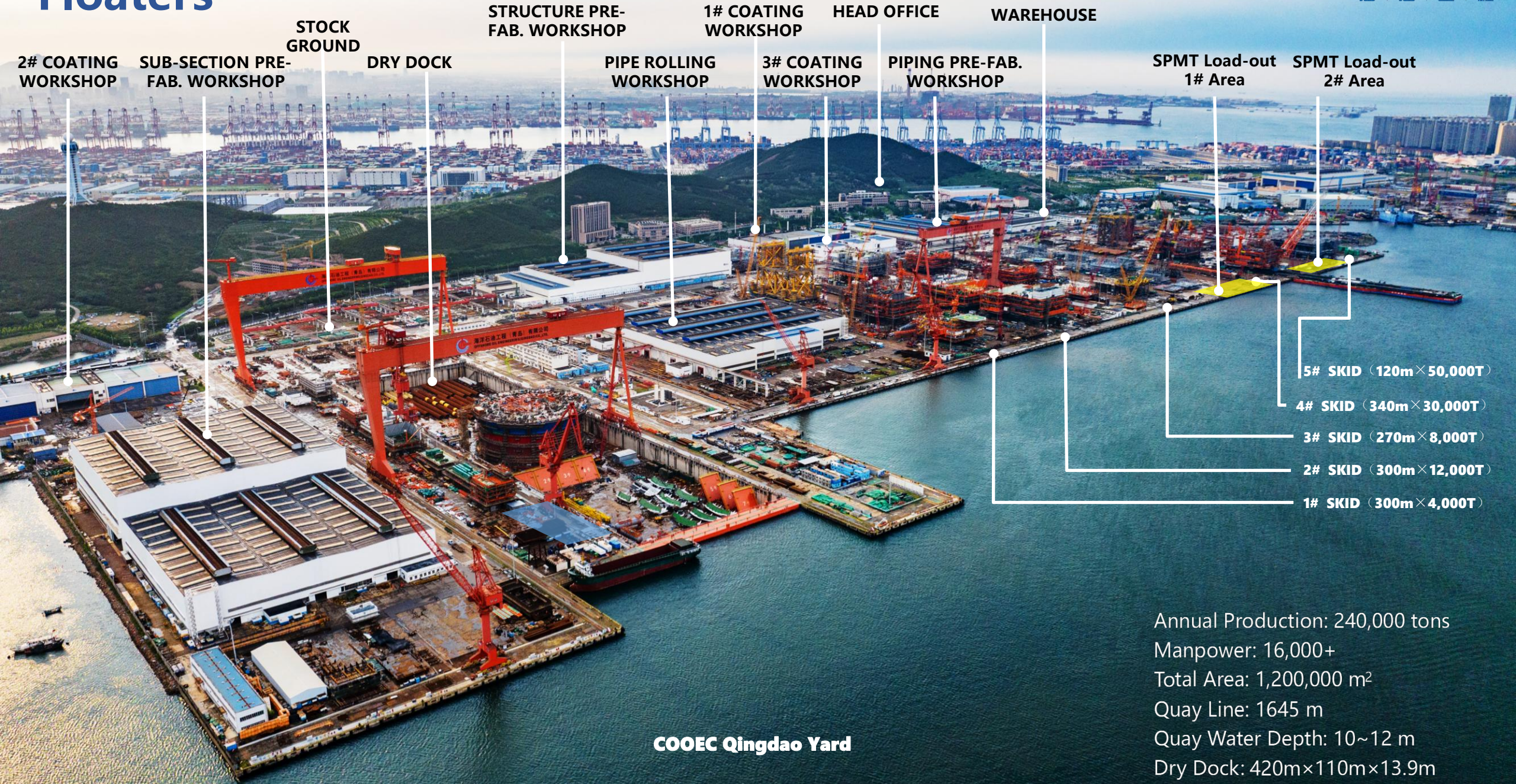
SPM

Design and technology system of SPM, including CALM, Soft Yoke, Internal turret

- Overall design technology
- Mooring load extraction and transmission analysis technology
- Bow angle analysis and design technology
- Integrated design technology for buoy and sliding ring stack



Floaters



COOEC Owns 19 installation vessels in 6 types and 17 ROVs(Work & Observation). The capability of installation is up to 3,000m depth



Lanjing 7500 Derrick (7,500tons)



HYSY201 Derrick & Lay (DP3, 4,000tons)



Lanjiang Derrick & Lay (3,800tons)



HYSY202 Derrick & Lay (1,200tons)



HYSY285 MSV (DP3, 3,000m)



HYSY286 MSV (DP3, 3,000m)



HYSY287 MSV (DP3, 3,000m)



HYSY289 MSV (DP2, 3,000m)



HYSY291 MSV (DP2, 3,000m)

19
Vessels

17
ROVs



HYSY278 Semi-Barge (DP2, 50,000tons)



HYSY229 Launching Barge(38,500tons)



HYSY295 Dredging Vessel (DP2, 300m)

4
Derrick & Lay

2
Heavy Lifting

7
Barge

6
Multi Service Vessel

锚泊系统安装 MOORING INSTALLATION

Professional T&I service for a wide range of mooring components from suction anchor, pile anchor, drag anchor to large diameter of chain, wire rope, polyester rope, and large MWA, etc. The company has significant experience in FPSO station keeping and mooring system hook up from shallow water to ultra deepwater up to 1,500+m.

提供从吸力锚、桩锚、拖曳锚到大直径锚链、钢丝绳、聚酯绳、大型MWA等各种系泊系统的专业T&I服务。公司拥有丰富的经验，可提供高质量的平台、FPSO的解脱、拖航、安装与回接服务，服务范围覆盖浅水到超深水，达到1,500米级。

1,500+m Deepest complex mooring system installed
200t Biggest suction anchor installed
10+ Large FPSO/FPS mooring system hook up completed

1,500+m 深水锚泊系统安装记录
200t 最大吸力锚安装记录
10+ 大型FPSO/FPS 锚泊系统安装与回接服务记录



17 Deepwater ROV

2 x Observation Class 观察级

- Seaeye Panther Plus (50HP 1,000m)

2 x Work Class 工作级

- Venom (100HP 1,000m)
- Quark (75HP 1,000m)

13 x Heavy Work Class 重工作级

- 2 x Quantum Series (150HP 1,000m)
- 2 x Quantum Series (150HP 3,000m)
- 3 x Quantum MKII Series (200HP 3,000m)
- 2 x HD Series (150HP 3,000m)
- 2 x UHD Series (200HP 3,000m)
- 2 x TXLX Series (150HP 3,000m)



深水安装-潜水能力 Diving

Air Diving System

5 x conventional suit; 3 x Hot Water Suit
4 sets of IMCA certified equipment
1 x Wet Bell

Diving Team

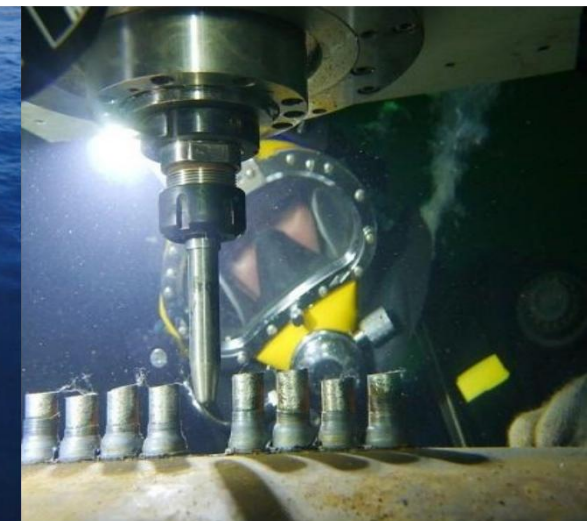
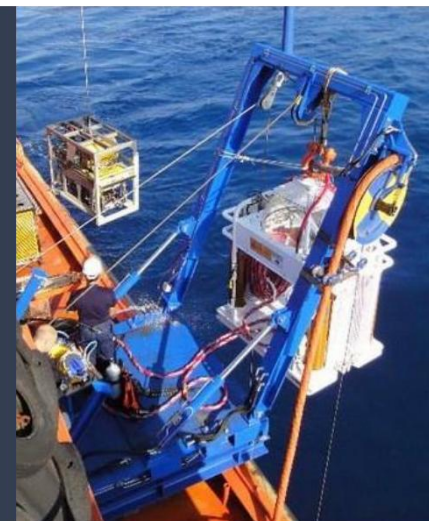
40+ ADCI/CCS certified divers

空气潜水系统

常规空气潜水设备5套; 热水服系统3套
IMCA潜水系统4套
开式钟1套

潜水员团队

ADCI/CCS认证各类专业潜水员40余人



300m Saturation Diving System

Diving bell for up to 3 persons
Maximum diving depth of 300m
DNV GL class
Living chamber for up to 12 persons
Self-launch ultra-high pressure evacuation system
Equipped with self-propelled high-pressure lifeboat

300米饱和潜水系统

3人潜水钟容量
最大工作水深300米
DNV GL级
容纳12人的居住区
自动启动的超高压疏散系统
配有自航式高压氧救生艇

Deep Sea No.1 SEMI for Lingshui Gas Field

Client: CNOOC **Location:** South China Sea

Time of completion: June 2021

Scope of work: FEED + EPCI

Project characteristics:

- **First** SEMI with 20,000t oil storage capacity in column in the world.
- **First** integration design of SURF in China
- **First** application of SCR in China.

Water Depth	1,220-1,560m
Length x Width x Height	91.5 m X 91.5 m x 59m
Condensate Oil Processing Capacity	1560m ³ /day
Condensate Oil Storage Capacity	20,000m³
Gas Compression and Treatment Capacity	10.5MM scmd
Weight	Hull: 33,500 tons Topside: 19,500 tons
Maximum Displacement	110,500 tons
Design Draft	35-40m

Challenges:

- Harsh environment of South China Sea
- Complicated geological conditions
- Production SEMI of 30 year design life without dry-docking
- long distance wet tow with muti-tugs
- Key members of EPCIC Management Team
- Full life cycle technical support services



Haikui No.1 FPSO for Liuhua Oil Field

Client: CNOOC **Location:** South China Sea

Time of completion: Sep 2024

Scope of work: FEED + EPCI

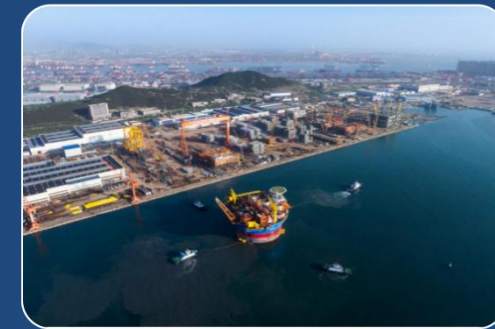
Project characteristics:

- **First** cylindrical FPSO of COOEC
- **First** applied inline mid-water buoy mooring system in the world
- **First** integrated design of operation system of COOEC

Water Depth	312m
Displacement	Around 100,000 tons
Diameter of unit in waterline plane	About 70m
Diameter of the processing deck	About 90m
Diameter of the bilge box	About 94m
Full loaded draft	22.8m
Ballast draft	18.5m
Design life	30 year

Challenges:

- Integrated design of Hull and Topside
- Many innovative approaches including integrated design of piping, new slamming load analysis model and new in-line buoy mooring system, etc
- Manage the harsh and complicated sea states



HYSY119 FPSO for Liuhua 16-2 Oil Field

Client: CNOOC **Location:** South China Sea

Time of completion: July 2021

Scope of work: EPCI

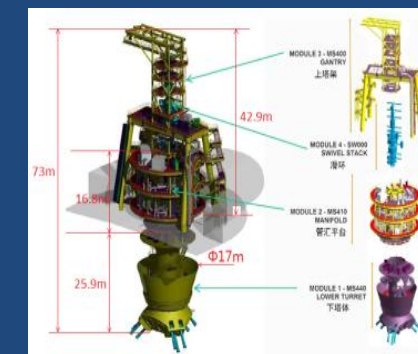
Project characteristics:

- **First** EPCI for FPSO Hull+Topside+SURF for COOEC.
- **Deepest** water depth for FPSO in south China Sea
- **Most** hang-off risers and umbilical in south China sea for SPM

Water Depth	420m
Oil Processing Capacity	18,157m ³ /d
Gas Compression and Treatment Capacity	465,818 scmd
Design Life	30 year
Storage Capacity	172,000 m3
Weight	Hull: 36,500 tons Topside: 11,000 tons
Number of Topside Modules	15
Maximum Displacement	191,600 tons

Challenges:

- Design process and storage facilities for LPG on new built FPSO with capacity over 2,800 cubic Meters
- Complex interface management between hull, topside, SPM and subsea system.
- High precision requirement for SPM construction and completion



P67/P70 FPSO

Client: Petrobras **Location:** Brazil

Time of completion: P67: May 2018; P70: December 2019

Scope of work: EPCI

Project characteristics:

- **First** EPCI projects cooperated with Petrobras
- **First** Detail Engineering Design for Topside & HULL
- **Leading** at each step of EPCI and avoid huge loss for Petrobras

Challenges:

- Transferred project
- 540000 man-hours, 5+ years, 130 professionals at the peak.
- 21200+ documents, all disciplines
- Material procurements technical support, 5200+ MALs
- 55,000+ punch list completed

Water Depth:	2,200m
Oil Processing Capacity:	150,000 bpd
Gas Compression and Treatment Capacity:	6MM scmd
Gas injection Pressure	550 bar
Storage Capacity:	1,600,000 bbl
Dry Weight (HULL + Topside) :	78,000 tons
Number of Topside Modules:	17
Maximum Displacement:	353,000 tons



TLP FEED Project

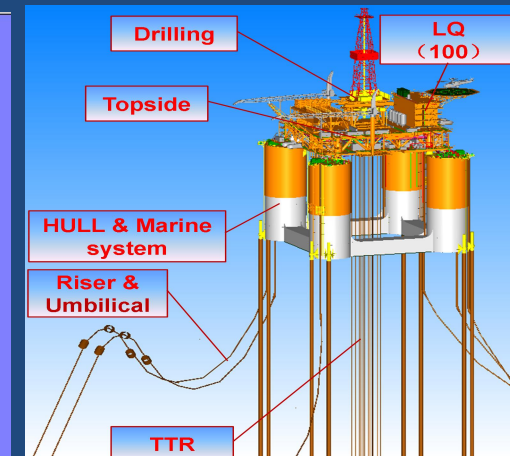
Client: CNOOC **Location:** South China Sea
Scope of work: FEED of 2 x TLPs

- ✓ Topsides and Hull, Drilling Module, TTRs
- ✓ Tendon and Pile
- ✓ Implement CNOOC' s total cost-efficient principle (Marginal field)
- ✓ Standardized design for two TLPs
- ✓ 3D model ready for next phase
- ✓ Third party verification by CCS and ABS joint entity

Water Depth	340m-410m
Condensate Oil Processing	1400 m ³ /day
Operation payload	16,250/17,380
Design draft	30.5m/32.5m
Free board	26m
Maximum Displacement	50,312 tons
Number of Tendons	8
Number of TTRs	12

Challenges:

- Shallow water TLPs (340m and 410m)
- Harsh environment in South China Sea
- Internal Wave load on Tendon and TTRs
- First TLP engineering design in China



NAN HAI FEN JIN FPSO for Hui Zhou Oil Field

Client: CNOOC **Location:** South China Sea

Time of completion: October 2023

Scope of work: EPCI for STP

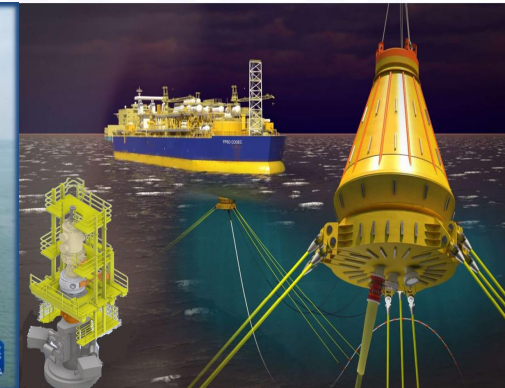
Project characteristics:

- **First** SPM EPCI of COOEC
- **First Refurbishment STP** Engineering for FPSO replacement.
- **First Hydraulic swivel made in China** applied on STP swivel stack

Water Depth	About 114m
FPSO Dimension(LXBXDA)	262mx46mx24.6m
FPSO Storage Capacity	1,600,000 bbl
Mooring system Nos	3X3
SPM type	STP
Design life	30 year

Challenges:

- New design STP to adapt to existing FPSO hull structure
- Mooring wire touch down evaluation in extreme environment conditions
- STP optimization design for the capacity of installation vessels



CALM for Hengyi (Brunei) PMB Petrochemical Project

Client: Hengyi Industries Sdn. Bhd **Location:** Brunei Bay near PMB

Time of completion: May 2019

Scope of work: Feasibility study, Conceptual Design, Basic & Detail Design (including Buoy Supply)

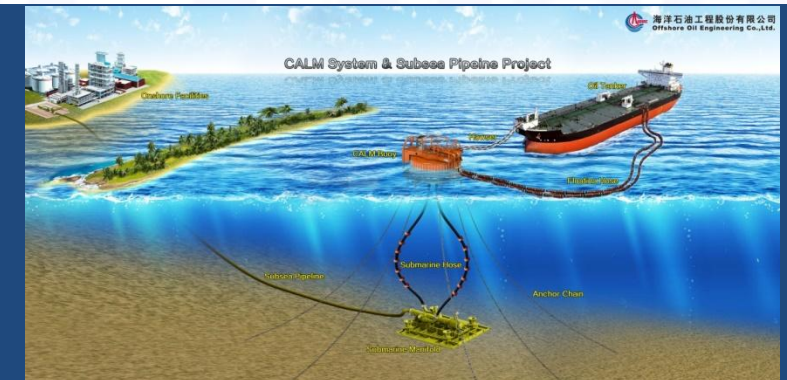
Project characteristics:

- **First** Projects cooperated with Hengyi Industries
- **First** Full stage work finished by COOEC
- **First** CALM Buoy Design & Supplied by COOEC

Water Depth	26-35 m
Tanker DWT	80,000-300,000 tons
CALM Byoy Type	Turntable
Submarine hose type	Chinese lantern
Mooring type	Catenary
Swivel type	RDU (Single pass)
Design life	25 year

Challenges:

- SPM System & CALM Buoy design
- Full stage design work, Feasibility study, Conceptual Design (including EIA, Pre-Engineering Survey, Navigation Assesemnt), Basic design and Detail design
- Construction Design of 44 inch Large Diameter Pipeline Crossing Island



Wushi 17-2/23-5 Project

Client: CNOOC **Location:** South China Sea

Time of completion: June 2024

Scope of work: Conceptual Design, Basic Detail + EPCI

Project characteristics:

- **First** Development of a Fixed Single Post SPM using crude oil offloading
- **First** SPM System suitable for shallow water areas

Water Depth	14.3-18.2m
Tanker DWT	50,000 t
Monitoring system (remote)	tension, pressure, leak, spilled oil, energy content of battery, camera, loudspeaker, etc.
Power supply unit	solar panel, storage battery
Type	skirt pile single column turntable single point mooring
Swivel type	20" RDU swivel
Design life	25 year

Challenges:

- SPM using in Extremely Shallow Water area (14m) .
- Developing the First Single post Turntable type SPM.
- Design of a Single Point Mooring System without Underwater Operations.
- Design of seabed excavation.



卓越工程 赋能未来

Empower the Future with Excellent Engineering

THANKS

谢谢

