

Shallow Water Oil&Gas Development Solution



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COOEC has many decades years of experience in offshore shallow water oil and gas development, and has formed a mature solution for fixed offshore oil and gas extraction platforms. The advancement, reliability, and safety of its solutions have been tested by time. By enhancing the value creation ability in all aspects, COOEC continues to provide customers with “package” solutions for marine energy engineering.

- ✓ Conventional Oil and Gas Field Development
- ✓ High-pressure Gas Field Development
- ✓ Heavy Oil Extraction Development
- ✓ Marginal Oilfield Development
- ✓ Engineering Standardization Design Capabilities
- ✓ Low-carbon Development Design Capabilities
- ✓ Large-scale Jacket and Topside Fabrication Capabilities
- ✓ Large-scale Jacket and Topside Installation Capabilities
- ✓ Pipeline, Flexible Flowline, Submarine Cable, Umbilical Installation and Pre-commissioning



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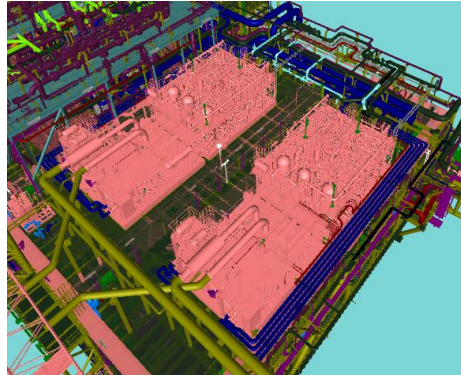
Design Capability for High Pressure Gas Field

COOEC has the ability of system design and construction of integrated high-pressure gas fields, ultra-high pressure gas injection compressors (discharge pressure exceeding 50MPa) and offshore pipelines with pressure up to 53MPa. It has coordinated the creation of a safety guarantee technical system for offshore high-pressure gas injection systems, and formed a set of high-pressure gas field development solutions.



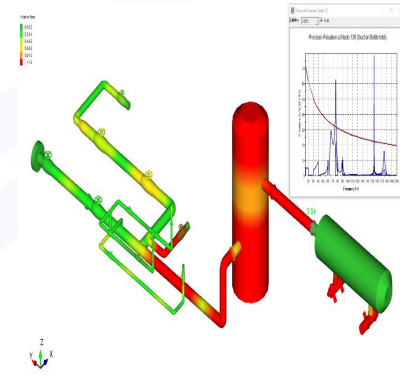
Ultra-high Pressure Gas Injection Platform

- The first ultra-high pressure gas injection platform in China
- Design technology of ultra high pressure gas injection platform system



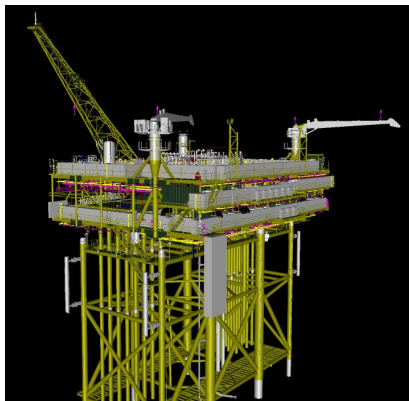
High Discharge Pressure

- Technology of overall layout and complex structure design of ultra-high pressure gas injection compressor



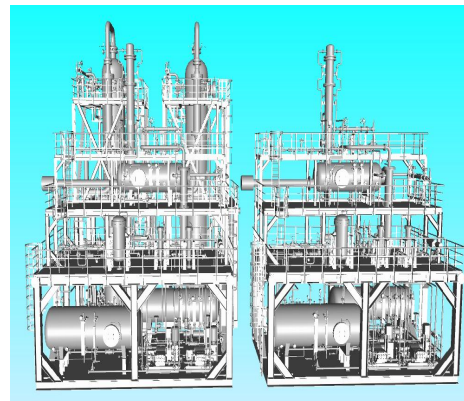
High Pressure, Large Vibration

- Pipeline layout design technology of ultra-high pressure gas injection compressor



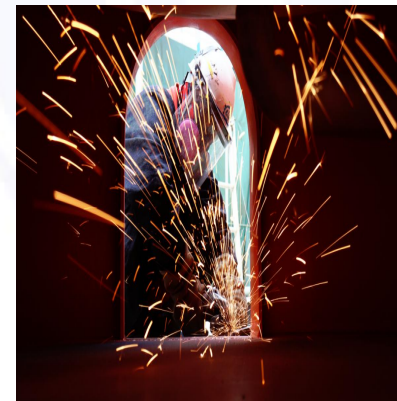
High Pressure

- Integrated design technology of ultra-high pressure wellhead platform



High Dehydration Dew Point

- Design technology of deep dehydration triethylene glycol system



Subsea Pipeline Pressure Exceeding 50MPa

- Design technology of ultra-high pressure and large wall thickness gas injection subsea pipeline
- Multi-stage pressurization start-up technology for initial start-up of ultra-high pressure gas injection pipeline
- Design technology of flow safety guarantee for 50MPa class ultra-high pressure gas injection pipeline

Design Capability for Heavy Oil Extraction

COOEC has mastered a range of thermal recovery development and design technologies for heavy and extra-heavy oil. We have achieved a series of technological breakthroughs in various aspects, including overall platform design, determination of implementation standards, research on thermal recovery processes, and safety risk control. This has led to the formation of a technical plan for large-scale and serialized offshore heavy oil thermal recovery development. The design scheme has been successfully implemented and applied in multiple offshore oilfield development projects in China.



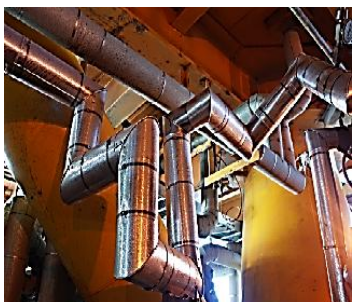
High viscosity, difficult to process



Difficulty in sand removal



Large size of mining equipment



High stress in steam pipeline



High risk of wellbore uplift



High risk of steam leakage

- Technology for layered arrangement of steam injection Christmas tree
- Design technology for heavy oil desanding treatment process
- New Application of Electrostatic Agglomeration Separator
- New Application of Weighing Hopper-type Metering Device
- Monitoring Technology for Temperature Field in Thermal Recovery Area
- Leakage Protection Technology for Steam Pipeline Flange
- Application of New Thermal Insulation Materials for Steam Pipelines
- New Applications of High-Temperature Protective Clothing and Workwear
- Monitoring Technology for Wellhead Displacement and Uplift
- Design Technology for Wellhead Control Panel
- Technology for Steam Pipeline at Large-Displacement Wellhead

Marginal Oil and Gas Field Development

COOEC has the ability to provide integrated marginal oil and gas field development solutions. The development of marginal oil and gas fields has been successfully implemented, including wellhead protection frames, simple fixed platforms, unmanned platforms, and shallow water subsea production systems. Customized engineering solutions can be provided based on the characteristics of the project.

Wellhead Protection Frames

Project: BZ34-3/5 wellhead protection frame, WZ6-8 wellhead protection frame.

Simple Fixed Platforms

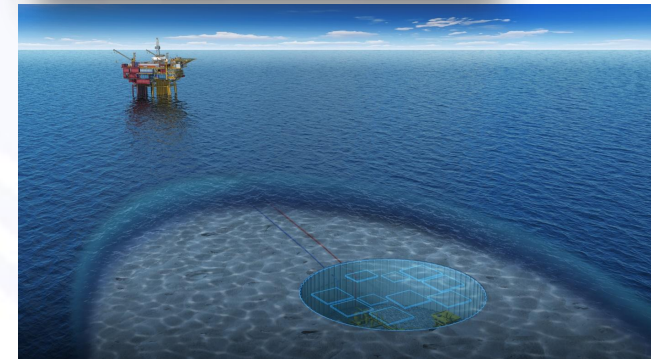
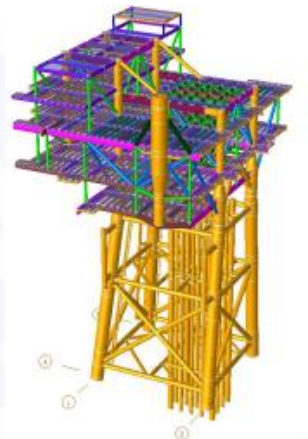
Project: CFD18-1 WHP Platform, JZ9-3 WHPB Platform.

Unmanned Platforms

Project: PY10-2, DF1-1, KL6-1, DF13-3 unmanned platform.

Shallow Water Subsea Production Systems

Project: DF1-1, LD22-1, JZ31-1, JZ25-1W



Engineering Standardization Design Capabilities

Based on the concept of 'Design for prefabricating, Manufacturing as Products, Integrated Installation' COOEC adopts a comprehensive standardization work method that emphasizes "Serialization, Simplification, Modularization, and Integration." Through studying the commonalities and differences of the Bohai oil and gas fields, COOEC has formulated a relatively fixed baseline for common configurations and used specific configurations as extensions. The achievements cover various levels such as technical requirements, material and equipment technical documents, general assembly, and platform facilities. Ultimately, this approach realizes the transition from customized to standardized oilfield development.

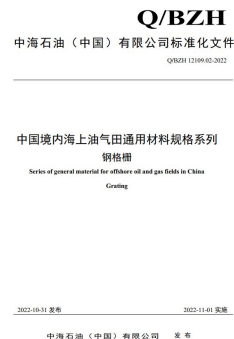
Technical Requirements

CCS/ABS/DNV/BV co-certification, new- developed projects, 100% application for these general technical specifications



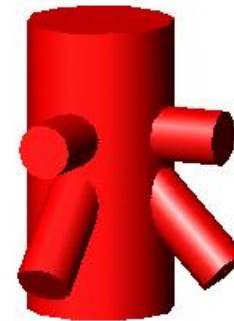
Material and Equipment

Serialized documents for materials and equipment developed. Centralized procurement rates been improved, a decreasing in equipment prices.



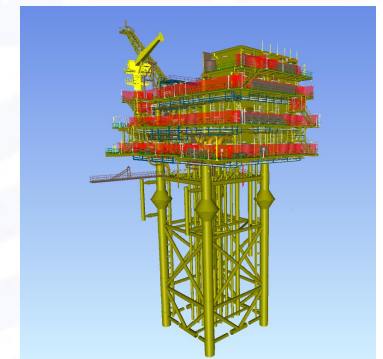
General Assembly

Standardized documents for General assembly published, prefabrication of products in advance.



Platform Facilities Design

6 types standardized Jackets
9 types standardized Topsides
5 types standardized LQ



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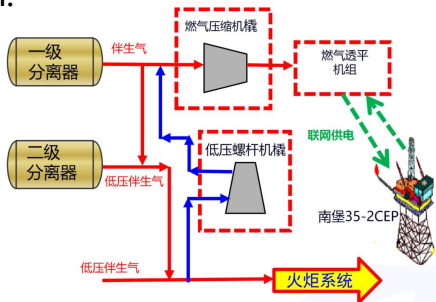
"Green, Low-carbon and Environmentally Friendly" Design Capabilities

COOEC has applied the green, low-carbon and environmental protection concepts to the EPCI project throughout the whole process. It adheres to the strict requirements of zero pollution, zero emission and zero rework in the whole process of design, procurement, construction and installation. As a representative of the company's "low-carbon oilfield", the CFD6-4 Central Platform was successfully put into operation in 2021. It is expected to recover a total of 246,000 cubic meters of condensate oil and reduce carbon dioxide emissions by 285,600 tons during its entire life cycle.



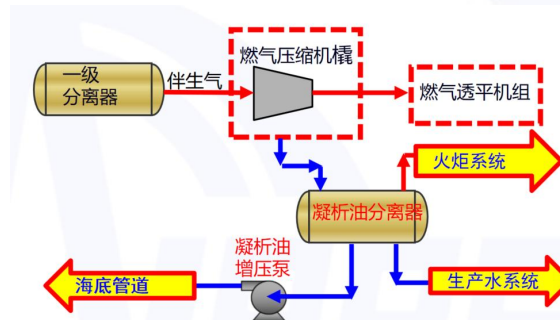
Associated Gas Utilization Plan

Connecting the gas turbine power station to the crude oil-powered main engines in the same region for power supply, we fully prioritize the utilization of associated gas from the oil field for power generation, thus reducing carbon emissions from crude oil-based power generation.



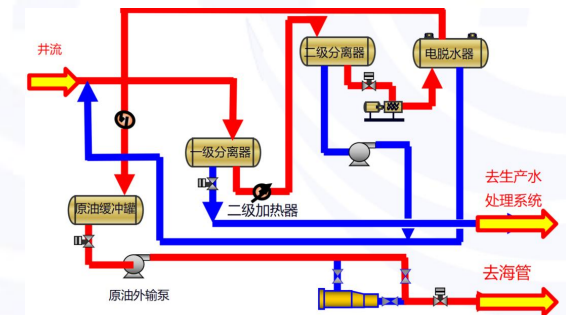
Condensate Recovery Plan

The process for condensate treatment is set up, and the condensate produced after the compression and condensation of natural gas enters the condensate treatment process and is exported along with qualified oil.



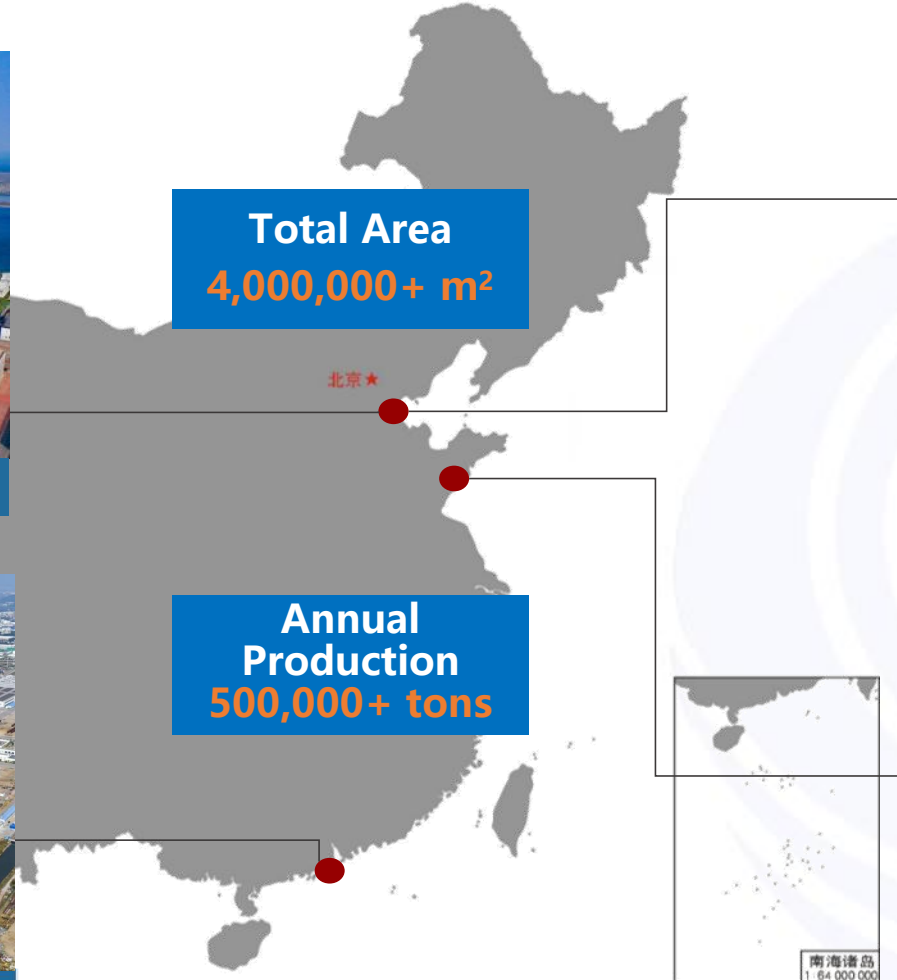
Waste Heat Utilization Plan

By utilizing production water to circulate and heat the production process, the efficiency of oil-water separation is improved, heat demand is reduced, thereby decreasing the amount of combustion and emissions.



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COOEC has large marine engineering manufacturing bases in Tianjin Binhai New Area, Shandong Qingdao, Guangdong Zhuhai and other places, with a total area of more than 4 million square meters and annual processing capacity of more than 500,000 tons, forming a site layout spanning north and south, complementary functions, covering deep and shallow water and facing the world market.



Shallow Water Oil&Gas Development Solution

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

Floatover Capabilities

COOEC' s floatover capabilities cover "**all sea areas, all weather conditions, and all series.**" Its business types include traditional floatover, deep and shallow water floatover, strand-jack floatover, and dynamic positioning floatover. LW3-1CEP project sets a record for the largest floatover (32,000tons) installation in Asia. The variety, quantity, operational difficulty, and technical complexity of Company' s floatover projects rank among the best in the world.



All-Weather

- ✓ All Kinds of Weather Conditions



Full-Series

- ✓ High-position Float-over
- ✓ Low-position Float-over
- ✓ Mooring System
- ✓ DP Float-over



Design Capability

- ✓ All Types of Floatover
- ✓ Deep Water Mooring Design
- ✓ Topside Transverse Loadout
- ✓ Wave and Swell Combination
- ✓ Floatover Aid Design

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Liwan3-1 EPCI Project

Jacket and topside are all over 30,000 tons

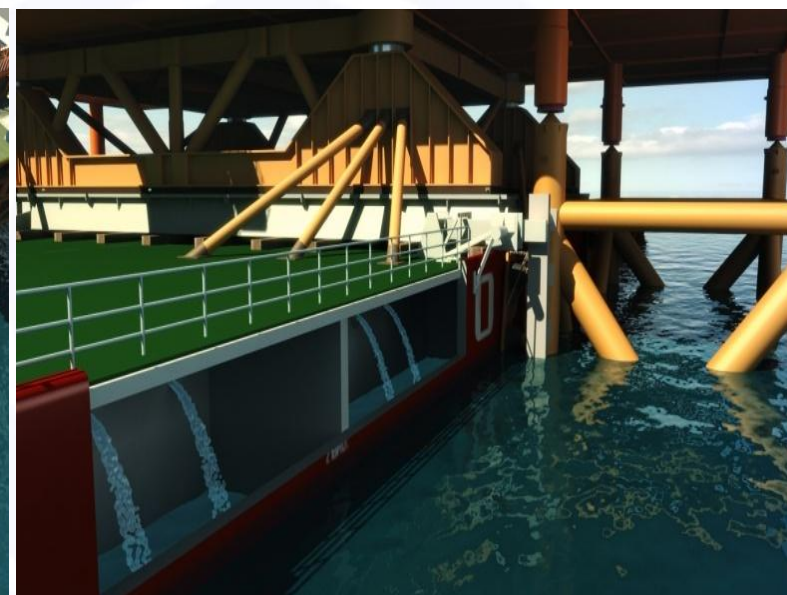
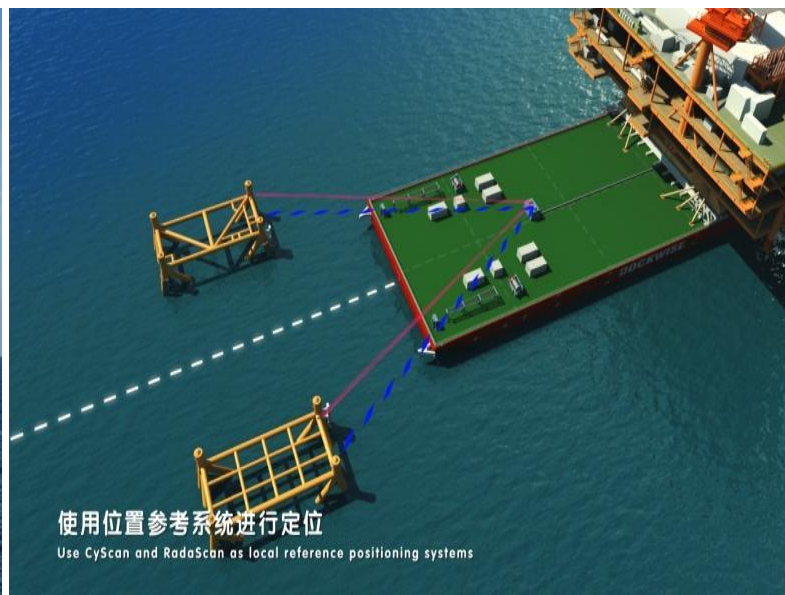
CLIENT	CNOOC / Husky
WEIGHT	Jacket: 31,000tons Topside: 32,000tons
LOCATION	South China Sea
DEPTH	190m / 1500m
SOW	<ul style="list-style-type: none">• Jacket + Topside• 270km 30" subsea pipelines• 78km 6" subsea pipelines(1,500m)



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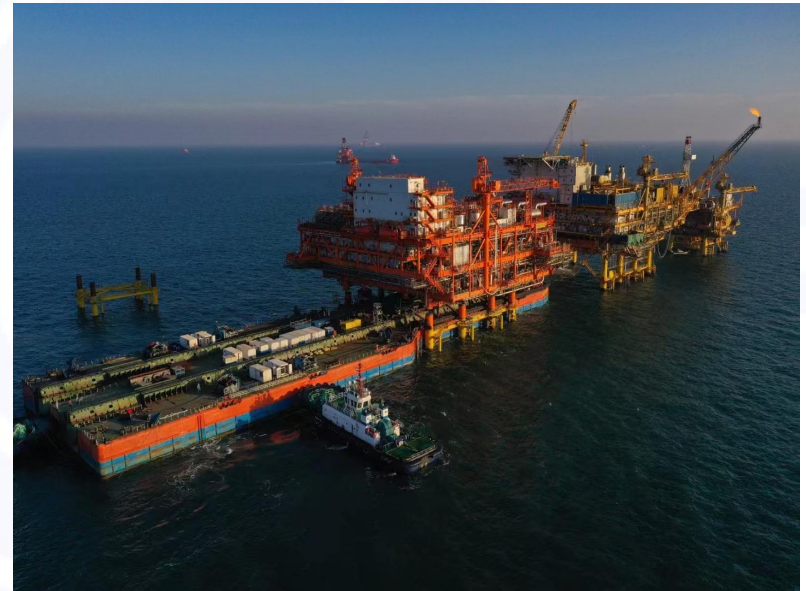
HZ25-8 and EP20-4 Floatover / HYSY278(DP-II Semisubmersible)

- ✓ DPP Topsides: 13,000tons & 15,800tons
- ✓ Transportation: Self-Propelled Vessel
- ✓ Installation Site: South China Sea
- ✓ Water depth: 100m



Kenli6-1 Floatover / HYSY228

- ✓ CEP Topsides: 15,000tons
- ✓ Transportation: HYSY228
- ✓ Installation Site: Bohai Bay
- ✓ Water Depth: 25m



Lifting Capabilities

LanJing7500 is a self-propelled moored crane vessel which was renovated in 2008. Lifting capacity 7500 tons, full rotary lifting capacity 4000 tons; Equipped with a 10,143 kW host; Equipped with 10 working windlass, with anchor positioning ability. It has the ability to install large structures in water depths up to 300 meters.



Topside Lifting



Piling Operation



Jacket Upending

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Lifting Capabilities

Lanjiang is a non-self-propelled crane vessel, built in 2001, Lifting capacity 3,800 tons, full rotary lifting capacity 3,000 tons; Mooring system with 12 high-grip anchors; With the ability to install offshore structures in water depths of less than 150m; Pipe diameter 4.5 "-36" (including coating) in water depth 6-150m, pipe diameter 48 "(including coating) in water depth 6-100m.



Topside Lifting



Jacket Lifting

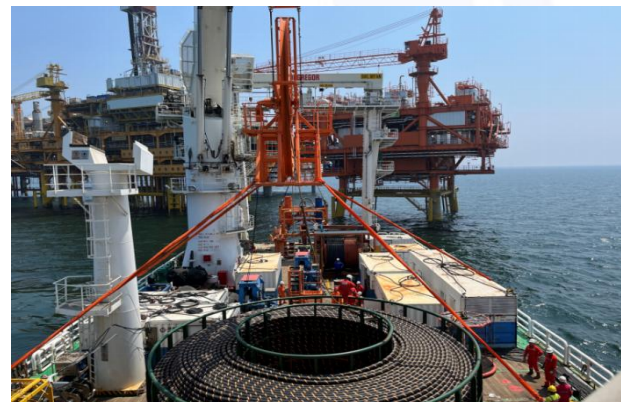
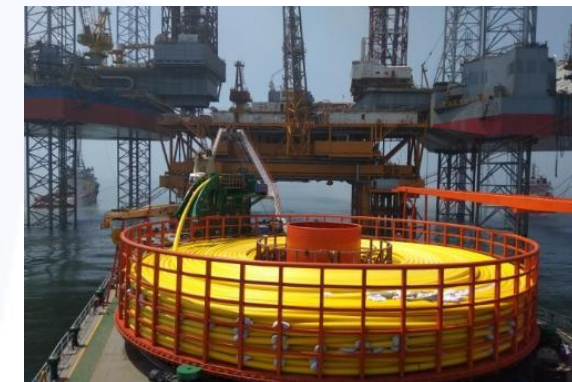


Pipeline Laying

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Pipeline / Flexible Flowline / Submarine Cable / Umbilical Installation

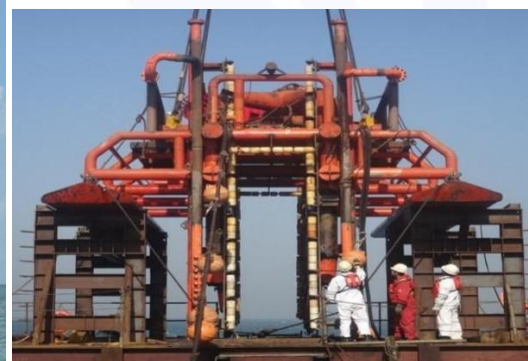
COOEC 's capabilities cover Pipeline, flexible flowline, submarine cable and umbilical installation activities, including horizontal laying, cable pulling, post-lay protections etc. HYSY278 is equipped with 10,000tons cable carousel, tensioner, cable burial machine, A-frame, crane and other professional cable laying systems, cable bury depth up to 4m.



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Pipeline Post-trenching

COOEC is equipped to handle the full range of post-trenching with depth of cover ranges from 1m to 8m on pipeline diameters up to 48 inches. Additionally the jet trenching system can be modified to further suit more demanding or special project requirements. The most efficient burial operations are conducted where the seabed material is less than 50kPa. For harder formations a separate jetting arm and ultra high pressure pump can be incorporated.



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Submarine Pipeline Pre-commissioning

COOEC's capabilities cover the full spectrum of shallow water pipeline pre-commissioning activities, including Flooding, Cleaning and Gauging, Hydrostatic Pressure Testing, Dewatering / Swabbing, Air Drying and Nitrogen Packing of offshore and onshore pipelines. The activities are supported by suites of equipment covering a wide range of high volume / pressure flooding pumps, hydrotesting pumps, dewatering compressors and dryers complemented by a full range of calibrated instrumentation.



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Empower the Future with Excellent Engineering

THANKS

谢谢

