

# Subsea Production Systems

**Capability & Experience** 

### INTECSEA has emerged as the industry leader in subsea systems

The offshore industry has moved to subsea systems configurations that are now more modular and allow greater flexibility with reduced risk. These concepts have been implemented worldwide. INTECSEA has been able to validate these concepts via many subsea deepwater project applications.



# Capability Overview

The INTECSEA subsea production systems engineering group has emerged as the industry leader in providing services for deepwater subsea technology for water depths of 2,800m and beyond.

INTECSEA has provided subsea systems engineering and project management services for numerous customers in many deepwater field developments. These projects include flow assurance analyses, system concept designs, cost analyses, concept evaluations, systems selection, and other systems engineering and project execution activities. Project responsibility ranges from conceptual design studies through field installation, commissioning, start-up, and operating manuals. INTECSEA has experience with all aspects of a subsea production system.

For each project, INTECSEA applies its engineering capability and extensive experience to address a range of development issues such as water depths, temperatures, pressures, and seabed conditions to facilitate the best solution for current needs while anticipating future expansions and tie-ins.

#### Services

- Technical studies
- Field deve engineerin
- Project an managem
- Subsea system engineerin
- Specificat work, bid
- Equipmer

With over 800 professional staff, INTECSEA is the largest assembly of dedicated deepwater specialists in the industry. The company's services range from technical and economic feasibility studies, to Front End Engineering Design (FEED) and detail engineering, procurement, and construction management through commissioning and operations support.

and economic •	•	System integration test coordination
elopment • ng	•	Subsea installation supervision
ent •	•	Start-up technical coordination
stems • ng	•	System operating manuals
ions, scopes of • packages	•	Flow assurance and operability
t procurement •	•	Asset integrity planning

# Engineering Services

#### Flow Assurance and Operability

Flow assurance encompasses the thermal-hydraulic design and analysis of multi-phase and single phase production and transport systems, as well as the prediction, prevention, and remediation of solid deposition and blockage formation. Flow assurance and operability efforts must provide solutions which are feasible over the life of the field for all modes of operation. A key aspect of flow assurance and operability success is maintaining detailed interfaces with many other technical disciplines on a project.

#### Project Management/Execution and Cost/Schedule Tracking

To execute a project, INTECSEA can provide personnel resources to an integrated customer team or a complete project management team depending on customer requirements.

#### Asset Integrity Solutions (AIS)

INTECSEA provides state-of-the-art integrity management services to a range of customers within the energy and engineering sector. We specialize in delivering these services either as fullscope life cycle packages bespoke to a customer, as a one-off activity, or any combination in between.

### Engineering Design and Analysis

During conceptual design, INTECSEA generates initial field design layout scenarios with sufficient detail to develop cost estimates and evaluate system performance. The concepts facilitate project management strategies for cost, schedule, and execution. This is accomplished by utilizing highlevel technical reviews of the project and identifying key components for development. Then, INTECSEA defines system configurations and field layouts, generates design specifications, develops project work scopes, creates vendor and bid packages, and provides vendor/ customer liaison and component recommendations. Finally, INTECSEA provides support and performs engineering tasks to finalize the design, reviews the design for functionality, and continues customer and vendor liaison to facilitate project execution.

### System Engineering

System engineering can be broadly described as the collection of tasks and work product that assure the total system has been defined, conceived, and executed with appropriate attention to system requirements and constraints. System engineering personnel work closely with the customer, functional leaders (reservoir, drilling and completions, operations, flow assurance, project engineering, etc.), other contractors, and the project team throughout the life of the project to coordinate, assist, and/or execute systemwide activities.



## **Project Experience**





Jubilee Field Development **CUSTOMER** Tullow Ghana Limited **LOCATION** Offshore Ghana

Shenzi Field Development **CUSTOMER BHP Billiton** LOCATION Gulf of Mexico, USA



K2 Field Development **Production Facilities CUSTOMER** Eni Petroleum LOCATION Gulf of Mexico, USA

IDENTIFY VEVALUATE DEFINE EXECUTE OPERATE

#### IDENTIFY EVALUATE DEFINE

The Jubilee Field is split into east and west sides by a subsea canyon and consists of the upper and lower Mahogany reservoirs in water depths ranging from 900 to 1,700m. The current phase of development includes nine production wells, six water injection wells, and two gas injection wells. A total of five production drill centers will be tied back to a turret-moored FPSO. Gas and production will be routed through a riser base structure to allow for delivery of lift gas to the base of the production risers. Each side of the field will be served by a main electrohydraulic multiplexed power/control umbilical and infield umbilicals with termination/distribution structures at each drill center.

INTECSEA assisted BHPB in evaluating field development options and supported their steps through the concept selection process and the execution phase.

The Shenzi field is located in Green Mississippi Canyon Blocks at a water depth of approximately 4,000 feet. Shenzi is an oil system with delivery capacity of 100M BOPD and 50 MCFPD of associated gas production. The overall development consists of three remote drill centers flowing back to a Tension Leg Platform (TLP) where the production will be processed to sales quality product.

INTECSEA supported the design and implementation of the K2 flowlines, risers, PLETs and structures, umbilicals, and remote controls at the FEED and detail design level. The K2 Project is to tieback three to five subsea oil wells, in approximately 3,900 to 4,500 feet water depth of Green Canyon Block 562 of the Gulf of Mexico, back to the Marco Polo TLP, the host facility. The subsea system consists of two well centers tied back to the TLP via dual Pipe-In-Pipe insulated flowlines in a piggable loop configuration and Steel Catenary Risers (SCRs). One umbilical was suspended from the host facility in a dynamic catenary configuration.



**Blind Faith Field** Development **CUSTOMER** Chevron LOCATION Gulf of Mexico, USA

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INTECSEA evaluated field development options and supported steps through the concept selection process, FEED, and detailed design. Chevron's Blind Faith field is located in Mississippi Canyon Block 696 at a water depth of approximately 7,000 feet. Blind Faith is an oil system with a high pressure reservoir (approximately 12,500 psi WHSITP) and the potential of high temperatures at the wellhead in excess of 250°F. The high pressure and high temperature production in 7,000 feet water depth make Blind Faith a technically challenging project. In fact, these parameters put design requirements at the leading edge of industry supplier capability.

Independence HUB (MC920) Subsea Field Development CUSTOMER Anadarko, BHP Billiton, Dominion E&P, Kerr McGee LOCATION Gulf of Mexico, USA

Anadarko Petroleum Corporation, BHP Billiton Petroleum, Dominion E&P, and Kerr-McGee Oil and Gas Corporation are developing a number of deepwater gas discoveries in the Gulf of Mexico, approximately 120 nautical miles southeast of Venice, LA. The fields comprise up to 15 subsea wells producing dry gas situated in water depths between 7,900 and 9,200 feet. Production from all fields will be routed back to a centrally located floating host facility via a subsea production, flowline, and riser system. The facility processed the production and provided compression required for export.



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#### Tamar Field Development **Engineering Design and** Procurement **CUSTOMER** Noble Energy

LOCATION Tanmar Field, Israel

IDENTIFY EVALUATE DEFINE EXECUTE OPERATE

The Tamar Development is located approximately 90 km from the Israeli shoreline at a water depth of 1,678m. Tamar Phase I tied back to existing onshore facilities in order to bring gas to market as soon as possible.

On behalf of Noble, INTECSEA undertook the engineering and procurement support for the execute phase of the Tamar field. The provided services included project management, design, engineering, procurement support, contract management support, supervision, commissioning management, start-up planning and preparation of operating procedures.

## Success Through Insight

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