## **Offshore Technologies**

Brian ROBERTS – Offshore Product Line Manager Innovation & Technology Center, Rueil-Malmaison, June 22, 2015





- Introduction to Technip Offshore
- Offshore Platforms and Technip's Differentiating Technologies
- Technologies to Access New Markets
- Field Development Integrated Approach with Genesis & Forsys



## **Technip Offshore**

A Complete Range of Products, Technologies & Services



GBS: Gravity Base Structure HUC: Hook-Up & Commissioning FPSO: Floating Production Storage & Offloading

TLP: Tension Leg Platform

FLNG: Floating Liquefied Natural Gas

Technip

## **Fixed Platforms**

**Optimization of Conventional Offshore Developments** 

#### **Focusing on Floatover**



- Installation of topsides in one operation, eliminate heavy lifts and reduce offshore hook-ups
- Technip spearheaded floatovers and performed many world firsts



- Remotely operated units
- Concept requiring less manhours & more standardization
- Genesis has a solid track record



\*Normally unmanned installation

## **Spar Platforms** *A Deepwater Evolving Solution*



Delivery of over 80% of the world's spar platforms

 Technip has driven the evolution of Spar platforms: Classic, Truss, Cell, Storage and with topsides floatover



Heidelberg: delivered in 2014

- Cost & schedule benefits from repeatability
- Boomvang & Nansen, Lucius & Heidelberg



### Arctic Spar Concept

 Spar design is being adapted for future Arctic projects

### Maintaining our leadership through evolution



## **Tension-Leg Platforms** *Taking Further Another Solution for Floating Dry Tree Unit*



#### Malikai TLP

VIM analysis using CFD

- TLP is an established solution for dry tree floating production units in water depths up to 1,500 meters
- Technip offers a standard TLP design
- Current projects: Malikai, Liuhua TLPs FEED "Design 1, Build 2"
- Technological strength in synergizing CFD analysis and model testing
- TLP and TAD VIM Model Test in cooperation with the University of Technology Malaysia

TLP: Tension Leg Platform VIM: Vortex Induced Motion CFD: Computer Fluid Dynamics TAD: Tender Assisted Drilling Offshore Technology Presentation - ITC - June 22, 2015



## Semi-Submersible Platforms Technip's Proprietary Wet & Dry-Tree Designs

Patent for HVS semi with superior motions and dry tree potential





Wet-Tree Concept



**Dry-Tree Concept** 

#### Proven experience in floatover topsides on semi-submersible hulls



- Topsides Floatover successfully performed on 3 Semi-submersibles: Brazil, for Petrobras
  - **P-51**
  - P-52
  - **P-56**



HVS: Heave & Vortex Induced Motion SuppressedOffshore Technology Presentation - ITC - June 22, 2015

## **FPSO** Providing Engineering & Technology for World-scale FPSOs

#### Some of our projects...



P58 & P62: FPSOs for Petrobras FPSO: Floating Production Storage Offloading SST: Spiral Stacked Turret Offshore Technology Presentation - ITC - June 22, 2015

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### **Our Technologies**

SST technology enables high pressure/high fluid flow transfer and high power electrical transfer within a turret





Technologies that monitor mooring line tension and hull stress, and for hull cleaning and inspection through Cybernetix



Mooring Leg Load Nonitoring System

Vibrating wire sensors are used for monitoring hull stress

Magnetic Hull crawler



## **Design One, Build Two: Repeatability in Offshore** *P-58 & P-62 (Parque das Baleias & Roncador)*

#### Client: Petrobras

#### Full engineering from FEED to Detail Design for:

- VLCC conversion into 2 new FPSO units including:
  - Naval architecture
  - Hull & Utilities adequacy & revamping
- Newbuild topsides and process facilities

#### Procurement support and technical assistance to attend 5 Construction sites

# Brazil P-58 & P-62

#### Production

- Oil production: 180,000 bpd
- Gas production: 50 million scfd
- Water depth: 1,400 meters
- First production: 2014
- Engineering service contract (1.5 million man-hours) demonstrating unique execution capability
- Local content >90%





VLCC: Very Large Crude Carrier BPD: barrels per day SCFD: Standard Cubic Feet/Day

## **FLNG** *Combination of expertise, experience & pioneering spirit*



- Technip is actively involved in Onshore, Offshore & Subsea Developments
- Fifty years of continued experience in LNG technology improvement and innovation

#### Long-term Involvement

- First Conceptual Design for a Barge-mounted LNG Plant in 1988
- More than 25 Internal & External Studies
- Cooperation with major IOCs, NOCs & Suppliers

#### Unique Expertise with Large-Size Projects

**Ongoing:** 

- Offshore
  - Prelude FLNG, Shell, Australia
- Onshore
  - Yamal LNG, JSC Yamal LNG, Russia
- Subsea
  - Kaombo, Total, Angola



FLNG



- Investment in R&D to enhance FLNG Safety
- Minimize health & environmental impacts
- Reduce costs through the technology development



HSE: Health Safety and Environment ALLS; Amplitude-LNG Loading System



### **Technologies to Access New Markets** *Ocean Thermal Energy Conversion*

- Technical feasibility and commercial viability studies ongoing
- Potential to provide economic and low environmental footprint for remote islands (reduces dependency on diesel fuel imports)



Generate electricity by using temperature differences between cooler deep & warmer shallow ocean water to run a heat engine



## **Technologies to Access New Markets** *Ice Multi Agent Simulator (Ice-MAS)\**



Offshore structure with a sloping surface crossing the waterline level

Artificial Island with ice encroachment

Interaction of a structure with a ridge (before, during and after)

# Cost savings by optimizing platform design to reduce ice loads and encroachment

\*Validation by Bureau Veritas



## **Technologies to Access New Market** *Ship Shape Platforms*



Turret mooring system designed for arctic ice conditions and NCS harsh operation

Dis-connectable turret mooring system for FPSO in Gulf of Mexico conditions

# Platform designs for harsh operations by Technip/Inocean for Arctic, North Sea and Canada drilling and production

NCS North Sea Canada: 14 Offshore Technology Presentation - ITC - June 22, 2015



## **Field Development Integrated Approach**





## **Continuous Involvement in the Offshore Field Development Process**



Being involved at early stage, from concept selection & definition, allows greater understanding of the project challenges

FID : Final Investment Decision



## **Juniper Project**

A way to make marginal fields development viable

#### **Original Project Delivery Model by Client**

- FEED Engineering contracts
- Execution phase separate contracts for:
  - Detail Engineering & Procurement Services for Platform
  - Detail Engineering & Procurement Services for Subsea and Pipelines Scope
  - Fabrication Contracts for Jacket/Piles & Topsides
  - Installation Contract for Jacket/Piles & Topsides
  - Installation Contract for Subsea & Pipelines
  - Hook-up & Commissioning Contract
- Client staff required to manage both technical and commercial contracts & interfaces

#### Final Project Delivery Model by Technip

- FEED Engineering contract
- EPCIC for platform, subsea and Pipelines





## World Class Offshore Designs adding to the Forsys Story



- Engaged to improve projects economics through optimized field development schemes (subsea architecture & offshore facilities)
- Unrivalled expertise for the design of hull & risers and for offshore process
- Topside impacts of subsea system changes are evaluated



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#### **Topside Process and Floater Layout Optimization with Subsea Processing**



## Thank you





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