The Advantages of an Integrated Approach to Subsea Tie-Backs

Egypt - Norway Technology Days
Tim Crome, Cairo, 12th February 2017
Meeting the world’s growing energy needs requires accessing hard-to-reach oil and gas resources that cannot be fully developed without significant and sustainable improvements in project economics.

Change is needed, now more than ever.
TechnipFMC is well-positioned to lead the change. By bringing together complementary skills and innovative technologies we can boost efficiency, lower costs, and accelerate schedules.

Our offerings extend from concept to project delivery and beyond. From an individual operation to an end-to-end solution, we are ready to transform project economics.
Driving value for clients

› Accelerate and integrate technology innovations
› Unlock possibilities to transform project economics
› Develop better integrated offerings across all operations
Broadest portfolio of solutions for the production and transformation of oil and gas
Unique worldwide footprint

TechnipFMC operates in 48 countries around the world

Africa
- Algeria
- Angola
- Cameroon
- Congo
- Egypt
- Gabon
- Ghana
- Mozambique
- Nigeria
- Tunisia

Asia, Australasia and Middle East
- Azerbaijan
- Australia
- China
- India
- Indonesia
- Iraq
- Kazakhstan
- Kuwait
- Malaysia
- New Caledonia
- Oman
- Pakistan
- Qatar
- Russian Federation
- Saudi Arabia
- Singapore

Europe
- Bulgaria
- Finland
- France
- Germany
- Greece
- Italy
- Netherlands
- Norway
- Poland
- Portugal
- Spain
- United Kingdom

North America
- Canada
- United States

South America
- Argentina
- Brazil
- Colombia
- Mexico
- Venezuela

Unique worldwide footprint
Integrated Subsea Technology
Subsea services value chain and drivers

The subsea system life cycle

- Drilling and completion
- Installation
- Operation and management
- Maintain production, increase recovery
- Plug and abandonment
- Subsea Drilling Systems
- Installation
- Asset Management
- Production Optimization
- Field IMR
- Well Services
**Advantage of the integrated contract model**

**Capturing the iEPCI value**

Traditional SPS and SURF approach

Integrated EPCI approach

- **Concept**
- **Pre-FEED**
- **FEED**
- **SPS**
- **SURF**

**Tender**

**First oil**

**Integrated SPS and SURF**

**Competition**

**Award**

**Accelerated First Oil**
Integrated approach to subsea design redefines project economics

Traditional approach

- One global contractor
- Integrated procurement
- Optimized subsea architecture

Enhancements

- Fewer SPS interfaces
- Reduced flowline and riser lengths
- Less complexity through reduced part counts

Proprietary technologies

- One global contractor
- Integrated procurement
- Optimized subsea architecture

Enhanced approach

Key benefits

- **Reduced** material costs
- **Simplified** equipment set-up
- **Optimized** flow assurance
- **Reduced** installation phase
- **Accelerated** time to first oil

Up to 30% CAPEX reduction
Transforming Project Economics

Conventional 8-Well Development of Today

Subsea Vision: Fully Integrated SPS + SURF

Deliver subsea fields at significantly lower cost with improved certainty of schedule and in less time
Integration supported by recent achievements

- First integrated project award
- Integrated Front End Studies from start of Alliance

Client: Statoil
Project: Trestak

- Integrated EPCI (engineering, procurement, construction, and installation) contract
- Full suite of products and services including subsea trees, manifold, umbilicals, and installation
- Early and broader involvement with operator
- Significant reduction in total project costs

Unique leadership: Integrated SPS+SURF solutions
TechnipFMC Subsea Tie-back Technology

Combination of SPS and SURF - elimination of interfaces

SPS
- Subsea Trees, Wellheads, Manifolds,
- Control Systems
- Tie-In Systems
- Subsea Processing and Compression

SURF
- Rigid and Flexible Flowlines
- Risers
- Umbilicals
- Installation vessels and equipment
Complexity of Subsea Hardware - Subsea Tree
Optimization of hardware

Hydraulic Connector
Same functionality but only 7% of parts!

640 Parts → 43 Parts
Design for installation - pipelay

PLEM Mock-Up

Size limitations for in-line structures
Optimization of hardware

**Compact Manifold**

Same functionality but fraction of weight and size ➔ allows installation by smaller vessels, or with pipeline

~200T
Optimisation of hardware

Integrated flexible pipe termination heads

Traditional termination head

Integrated termination head
Umbilicals – UK, USA (Houston) and Angola

UK Facility - Newcastle

Hose manufacturing

R&D Facility

Thermoplastic facility

Steel Tube facility

~60m high
Integrated offering – Satellite Production System
Satellite Production System
Integrated installation and pre-commissioning

- SPS and SURF installation and well start-up
- Integrated tooling and personnel
- Combined reel umbilical and flowline installation

- Optimized logistics and mobilization
- Typical campaign duration 35-45 days
- Accelerated first oil
Integrated EPCI Project Example
Trestakk iEPCI® Project for Statoil

Statoil, Head of Project Development:

“By rethinking our concept along with license partners and suppliers, we have arrived at a solution that costs almost 50% less than the original concept. At the same time, we have been able to increase the recoverable resources significantly”

Field discovered in 1986, investment decision made 30 years later!
**Trestakk iEPCI® Summary**

**Project Summary**
- Tie-back production to Åsgard A
- 5 wells; 1 template with 2 production and 2 gas injection wells and 1 satellite production well
- Control via a new umbilical from existing template
- Main marine season 2018

**Main optimizations**
- Routing of umbilicals, flowlines & use of direct tie-ins
  - reduced lengths
- Structure design (template and satellite)
  - Tailor made for installation vessel
- Flexible jumpers (instead of spools, with integrated heads)
- Optimized Marine Operations and simplified RFO
- Reduced Project Management and Client Teams
Summary Trestakk iFEED®
Cost improvements Q3 2015 to Q4 2016

Total cost improvement: 18% of iEPCI® price at start of optimization study Q3 2015
Commitment to safety and quality

We cultivate a climate of safety and quality by exemplifying outstanding behavior.
Success will depend on our ability to deliver sustainable substantial value to our Clients

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<th>SUBSEA – High Level Aims</th>
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<tr>
<td>50% Capex reduction</td>
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<td>50% Time to 1st oil</td>
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<td>50% Opex reduction</td>
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**Anticipate**
Needs in a changing economic climate

**Develop**
Integrated synergies in a Life Cycle perspective

**Unlock**
Long tiebacks, stranded or uneconomic assets

Ensure economic viability in a 30$ per bbl context