WHO WE ARE

One of the **world’s leading** global contractors in **seabed-to-surface** engineering, construction and services.

**Cost-effective** technical solutions enabling delivery of **complex projects** in all water depths and **challenging offshore environments**.
OUR VISION

To be acknowledged by our clients, our people, and our shareholders, as the leading strategic partner in seabed-to-surface engineering, construction and services.
OUR DIFFERENTIATORS

PEOPLE
Project delivery based on our expertise and know-how

TECHNOLOGY
Delivering market-driven and cost-effective solutions

ASSETS
A diverse fleet of vessels and strategically positioned global assets

ALLIANCES & PARTNERSHIPS
Collaborating to deliver optimal field development solutions

LOCAL PRESENCE
Building local business and embedding local capability

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Our Strategic Technology Programmes

- Business driven technology solutions to address industry wide challenges
- Client-centric innovation
- Cost-efficient and commercially relevant outcomes
A LEADER IN DEEPWATER RISER SYSTEMS

- **Cost-efficient** solutions
- Uniquely **wide portfolio** of riser solutions allowing optimised concept selection for each project
- **Strong track-record**, including large EPCI projects
- Optimised riser integration into field development
- **Improved** flow and integrity **performance**

**Coupled Systems**

**Un-Coupled Systems**
FLOWLINE SYSTEMS

Developing portfolio of high performance and cost-efficient flowline solutions to enable optimum field architecture.

- Active heating systems - Electrically Heat Traced Flowline Pipe-in-Pipe (EHTF PiP) with most energy efficient system in market
- Longer tie-backs
- PiP with industry leading thermal performance
- Enable more cost efficient solutions
- Integration of continuous health monitoring
- Non-Destructive Testing (NDT)
- Field Joint Coating (FJC)
Integrating compact subsea processing systems into our solutions.

- Integration of subsea processing functions by providers into standardised and modularised transport and installation system
- Towed Production System as technology platform for carrying processing plants
- Small plants or subsea production solutions replacing platforms
- Short or long distance tie-backs in shallow and deep waters
BUNDLES

Enhancing Pipeline Bundle technology solutions for global market. Developing towed production systems.

- Multiple flowlines packaged inside a carrier pipe
- Terminates with towhead structures (manifolds)
- Fabricated on-shore in a single length
- Towed to site by CDTM (Controlled Depth Tow Method)
LIFE OF FIELD & REMOTE INTERVENTION

Developing technology to support integrated Life of Field services and products across the field lifecycle.

- Exploration
- Development
- Production uptime
- Production enhancement
- Production intelligence
- Surveillance
Subsea Integration Alliance technology proposition

Integrated offering to deliver increased value

Two leading companies bringing portfolio of value driven technologies

Our combined know how is delivering enhanced technology for the future
Subsea Integration Alliance technology focus

OneSubsea
- Production Systems
- Processing Systems
- Services
- Control Systems
- Integrated Solutions

Subsea 7
- Riser Systems
- Flowline Systems
- Bundles
- Subsea Processing
- Life of Field
Proprietary technology and Intellectual Property (IP)

- Subsea 7 has over 750 granted and pending patents contained in ~170 patent families.
Creating Value through Innovation & Technology

Capturing decades of experience and creating new step-changes for the future.

- Solutions that reduce CAPEX costs related to subsea field developments
- Enabling increased recovery rates
- Increasing value extracted from existing field infrastructure
- Enabling development of complex reservoirs
- Integration of continuous health monitoring
- Lowering OPEX costs of subsea operations
Latest key technology development areas

**LONG-DISTANCE TIE-BACKS**
Transforming the economics of field development

**PIPELINE BUNDLES & TOWED PRODUCTION SYSTEMS**
Enabling the next generation of subsea architecture

**DEVELOPING COST-EFFICIENT PIPELINE MATERIALS**
Reducing field development costs

**DEVELOPING THE FUTURE OF IRM THROUGH INNOVATION**
i-Tech Services a leading Life of Field Partner
Long-distance tie-backs

An increasing number of offshore oil and gas developments can be made viable with **long-distance tie-backs** by eliminating the need to add expensive topside facilities.
Long-distance tie-backs

Over 20% of near to medium term development concepts are “long”
Long-distance tie-backs

- Our aim is to provide operators with solutions that can tie-back remote fields to existing facilities over longer distances.
- A typical 15km tie-back today reaches an area ~700km².
- A future 150km tie-back would reach an area **100 times larger**: ~70,000km².
Long-distance tie-backs

Main challenges are Flow Assurance

Waxing occurs when oil cools and solidifies in the pipeline

Hydrates form at high pressures and low temperatures
Long-distance tie-backs

- Temperature reduction as the fluid is transported longer distances may lead to wax deposits on the pipe wall and hydrate formations during operating or reset conditions
- Our technology addresses this in three different ways:

  **Active heating**
  ![Active heating image]

  **Subsea processing**
  ![Subsea processing image]

  **Cold flow systems**
  ![Cold flow systems image]
Long-distance tie-backs

Active heating

• Subsea 7 is the only contractor with all three active heating technologies:
  – Direct electrical heating (DEH)
  – Electrically Heat traced flowline (EHTF) and
  – Hot water circulation in a Pipeline Bundle

• Topside power generation limits the length of pipeline that can be heated

• Our EHTF technology, developed with manufacturer ITP Interpipe, is one of the most efficient active heating systems available in the market today

• EHTF pipeline will be installed by reel-lay, using *Seven Oceans and* our new-build reel-lay vessel due to join the fleet in 2020.
Long-distance tie-backs

**Subsea processing**

- Moving topside processing facilities to the seabed
- Subsea separation, seabed pumping and gas boosting
- Subsea Integration Alliance, with OneSubsea, brings market-leading capability
- Subsea 7 is using tow-lay installation techniques to support subsea processing.
Long-distance tie-backs

**Cold flow systems**

- Flow assurance for very long-distance tie-backs
- Maintain production at ambient seawater temperatures
- Wax Control Unit (WCU) based on Bundle and Pipe-in-pipe technology
- Waxing is controlled by the WCU to localise wax deposition
- Subsea 7 is currently developing and qualifying the WCU as part of a larger development programme supported by the Norwegian Research Council
Long-distance tie-backs

Pipe-in-pipe

Heated pipe

Cold Flow

Wax Control

Processing

Host

Wet Insulated / PIP

EHTF

LTB > 50 km

Host

Host

Host
Long-distance tie-backs

Recent Subsea 7 projects with active heating:
- The world’s first implementation of reeled CRA-lined carbon steel pipe with DEH active heating on the Maria project for Wintershall, offshore Norway
- The deepest DEH system implemented to date on Chevron’s Lianzi Project, offshore Angola, 43km long and 1070m water depth.

Tenders and prospects with active heating and long-distance tie-backs
- Aker BP, Snaad, Norway, 21kms of EHTF
- Total, Garantiana, Norway, 52kms of DEH
- CNR, Kossipo, Ivory Coast, 15kms of EHTF
- VNG, Pil&Bue (Fenja), Norway, 67kms of EHTF
Pipeline Bundles and towed production systems

**Pipeline Bundles**
Flowlines, injection lines and control umbilicals within a rigid, large-diameter carrier pipe

**Towed production systems**
Cost-effective installation of equipment within a modular platform
Pipeline Bundles and Towed Production Systems

Multiple flowlines packaged inside a carrier pipe providing significant cost reductions compared to other pipe lay installation methods.
Pipeline Bundles and Towed Production Systems

Terminates with towhead structures (manifolds)
Pipeline Bundles and Towed Production Systems

Fabricated on-shore in a single length
Pipeline Bundles and Towed Production Systems

Towed to site by Controlled Depth Tow Method (CDTM) – upwards of 10,000 tonnes of pipeline system
Pipeline Bundles and Towed Production Systems
Pipeline Bundles and Towed Production Systems

- Bundles completed: **81**
- Longest single Bundle length: **7681 metres**
- Longest tie back length: **28 kilometres**
- Heaviest single Bundle constructed: **9154 te**
- Heaviest Integrated Structure: **547 te Leading and 451 te Trailing**
- North Sea installation: **42 metres to 410 metres**
- Longest tow from Wick: **1000 km**
Bundle Development Timeline

- **1980**: First Bundle (Murchison)
- **1988**: First Norwegian Bundle (East Frigg)
- **1992**: CRA Pipe within a Bundle (Embla)
- **1995**: Bubi Lined Pipe Bundle (BP Cyrus)
- **1997**: Actively Heated Bundle (Asgard)
- **1997**: Shallowest Bundle 42m (Maersk Dan)
- **2001**: Midline Structure/Riser Base (Leaon)
- **2004**: Tie-in with Hyperbaric Weld (MCP-01)
- **2012**: Longest Tie-back 27.1km (BP Andrew)
- **2013**: HP/HT 160°C / 604bar (West Franklin)
- **2013**: Largest Carrier 56.4” (West Franklin)
- **2014**: Longest Bundle 7596m (Enochdhu)
- **2014**: West of Shetland (BP Clair Ridge)
- **2014**: Heaviest Towhead 550te (BG Knarr)
- **2014**: Deepest Carrier Bundle 410m (BG Knarr)
- **2014**: >HP/HT, >Deepwater, >Length, >Flexibility
Pipeline Bundles and Towed Production Systems

• Bundle Migration Plan
• HP/HT advancement (>220°C)
• Deepwater Applications (500m>3000m)
• Condition monitoring – Fibre Optics
• Electrical Trace Heating

• Extended Length tows
• Subsea Processing within Towheads
• Temperature Control Systems
• Underwater Intervention Drones hosted in towheads
• Integrated towhead boost pumps

Deep Water Buoyancy

EHTF suitable for bundle solutions
Pipeline Bundles and Towed Production Systems

**Submerged Production Unit** (SPU), our versatile hybrid structure designed to house large subsea processing plants and integration of pre-qualified equipment via standard interfaces.

- Steel sub-frame
- GRP super structure
- Re-useable buoyancy
Pipeline Bundles and Towed Production Systems

**Transport and Installation Frame (TIF)** - allowing individual modules to be installed and changed out to suit field requirements
Pipeline Bundles and Towed Production Systems

Subsea Toolbox
Standardised
Scalable
Re-useable
Pipeline Bundles and Towed Production Systems

Subsea Processing
Pipeline bundles and towed production systems

• Recent projects with Pipeline Bundles:
  – BP **Andrew** Development – 28 km tie-back
  – BG **KNARR** – deep water, large towheads
  – Premier **Catcher** - FPSO with 3 bundles
  – Apache **Callater** – new field with a repeat bundle design
  – Total **Jura** – large towhead with retrievable modules

• Tenders and prospects with Pipeline Bundles:
  – Statoil Snorre Expansion project
  – Shell Penguins project
  – Nexen Buzzard phase 2
  – Australian Bundle projects
Cost-efficient pipeline materials

• Conventional pipeline material solutions are reaching cost-efficiency limits for:
  - deeper water production,
  - higher pressure and temperature wells and
  - more aggressive service environments

• Subsea 7 continues to extend the boundaries of materials development

• Key enablers include:
  - polymer-liner,
  - high strength steels,
  - corrosion resistant alloy and
  - composites
Cost-efficient pipeline materials

Higher strength steel

- Decreased pipe wall thickness lowers procurement and fabrication costs
- Reduced pipeline weight decreases the installation top-tension requirement
- Development collaboration with Vallourec
- Reelable X80 pipe and welding solution now qualified for flowlines and risers including sour service

Pulsed Gas Metal Arc Welding
Cost-efficient pipeline materials

**Corrosion Resistant Alloy (CRA)**

- CRA mechanically lined pipe is a cost-effective anti-corrosion solution
- Subsea 7 has pioneered the installation of Bubi® CRA lined pipe, in collaboration with Butting
- CRA pipe can be applied to both flowlines and risers
- Next evolution is adhesively bonded Glubi® lined pipe
- Subsea 7’s **Girth welding technology** enables CRA to be combined with high strength steel pipe

Seven Oceans installing mechanically lined Bubi® pipeline
Cost-efficient pipeline materials

Polymer lined pipe

- Polymer lined pipe is approximately **35% cheaper** than CRA for water injection pipes and is suitable for all installation methods
- **Swagelining**, owned by Subsea 7, has developed a polymer connector, **Linerbridge®** as an alternative CRA connector
- The next step is to extend polymer linings to use in hydrocarbon pipelines
Cost-efficient pipeline materials

**Composite materials**

- Alternative materials have already been used in subsea structures
- Alternative pipeline materials are being evaluated to overcome weight and expense limitations on ultra-deep and HP/HT developments
- Subsea 7 is working with vendors on developing Thermoplastic Composite Pipelines (TCP)

Thermoplastic Composite Pipe
Cost-efficient pipeline materials

Recent Subsea 7 projects with cost-effective pipeline materials:

- The Mad Dog 2 project for BP is the first project outside the North Sea to use Swagelining technology
- The Maria project for Wintershall used LinerBridge® connectors on its reeled water injection pipelines

Tenders and prospects with cost-effective pipeline materials:

- Petrobras’ ultra-deep Libra project could benefit from composite risers in the future for the later phases
- Swagelining is currently working with The Welding Institute (TWI) and Saudi Aramco to assess hydrocarbon pipeline applications
IRM and i-Tech Services

i-Tech Services

- Inspection, Repair and Maintenance (IRM) of existing offshore infrastructure
- Drawing on cutting-edge data management and geographical information systems to increase maintenance efficiency
- Bespoke ROV tooling solutions
- Over 175 ROVs
- Over 35 year’s experience.
IRM and i-Tech Services

INTEGRATED DATA & SURVEILLANCE

SENSORS & REPAIR SYSTEMS

AUTONOMOUS & HOSTED SYSTEMS
IRM and i-Tech Services

**Integrated Data & Surveillance**

- Enabler to improved decision making and focus on critical datasets
- Increased responsiveness through Standardising and Automating data processing systems
- Visual recognition systems and AI predicting events, failures and trending data.
IRM and i-Tech Services

Sensors, Monitoring & Repair Systems

- Enabling sensors for real time condition monitoring and life extension
- Fast response repair solutions to maintain availability and lower MTTR
- Development of low cost repair and tie-in solutions using epoxy
- Suite of tooling enabling rapid deployment.

Emergency Pipeline Repair System
IRM and i-Tech Services

**Autonomous & Hosted Systems**

- Enable harsh environment, remote and environmentally sensitive area operations and reduce dependency on ROV support vessel
- Electric based systems for reliability, power efficiency and environmentally sensitive
- Bring end user closer to operations through Autonomous and semi autonomous systems
- Machine/visual recognition systems enabled.
IRM and i-Tech Services

- Enhancing total cost of ownership of new and existing fields through technologies

- Incremental Development
- Remote Systems
  - Reduce Offshore crew & HSE risk
- Faster Data Cycle
  - Acquisition
  - Processing
  - Reporting
- Faster Repair Systems
- Reduce Vessel Time
  - Autonomous and seabed Hosted Systems
- Disruptive Solutions
- Intelligent Asset Management
  - Predictive Maintenance Systems
  - Feedback loop to OPEX risks in greenfield design
IRM and i-Tech Services

Recent i-Tech Services technology activity includes:

- The design, development and delivery of the EPRS for Chevron & INPEX
- Use of autonomous surface vessels in the metrology and survey of fields in Gulf of Mexico and Egypt
- Design, testing and verification by DNV-GL of an emergency closure BOP Intervention Skid
- Ongoing developments for Statoil on development of an underwater intervention drone concept.
Creating Value through innovation and technology

Client-responsive technology development that is delivering technological innovations and solutions to the market that create real value
THANK YOU