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Mooring Technology
FPSO Technology
Floating Gas Technology

The sole intention of this factsheet is to share general information.

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March 2017

SBM Offshore Technology Awards over the last 6 years

2017 - Stones FPSO Turret Mooring System
2015 - ARCA Chain Connector System
2014 - VHP Fluid Swivel
2013 - Drilling Riser Trip SaverTM
2011 - COOLTM LNG Marine Transfer Hose
2011 - HV-AC Electric Swivel
A Pedigree of Innovation

SBM Offshore’s long history of innovation started more than 60 years ago when the Company worked with its client Shell to develop the first Catenary Anchor Leg Mooring (CALM) buoy terminal. Since then, SBM Offshore has continued to anticipate the industry’s needs and bring innovative new products to the market. Over the years this has included:

Mooring Systems for floating production units, from the initial systems in shallow water and mild environments, to ever deeper and harsher conditions. SBM Offshore has maintained the position of market and technology leader in offshore mooring systems continuously since that first CALM buoy terminal for Shell in 1959.

The Floating Production Storage and Offloading (FPSO) product, from pioneering the leased FPSO market based on tanker conversions, to steadily moving to increasingly larger capacities and more complex processing units.

Floating Production Units (FPUs) including Tension Leg Platforms and Semi-Submersibles, reaching ever deeper water and more challenging environments as well as accommodating increasingly complex SURF (Subsea, Umbilical, Riser & Flowline) interfaces.

Transitioning FPSO technology into Floating Gas System (FGS) production technology, especially around LNG FPSO and offshore Gas To Liquids (GTL) technology.

Renewable Energy products utilizing SBM Offshore’s hydrodynamics and mooring systems expertise to create a new range of offshore clean energy projects.

Technology Trends in the Offshore Energy Industry

To ensure that its investment in technology development is focused in the most rewarding areas, SBM Offshore carefully monitors and tracks market trends to identify future technology gaps, and ranks these to select promising areas for R&D and product development.

However, in today’s economic environment, overriding all of the technology trends is a need to reduce field development costs. This makes the challenge more difficult to develop new technology which will both meet the growing technical challenges and at the same time reduce field development costs. SBM Offshore thrives on such challenges.

SBM Offshore seeks direct feedback from clients via a regular series of Technology Days. In these interactive and informative sessions SBM’s technology experts explain our ongoing development programs and discuss alignment with clients’ current and future needs.

Key Facts

Around 1% of annual revenues re-invested in Technology development

100+ staff in global team dedicated to Technology

180 active SBM Offshore patent families

2,900m mooring water depth achieved using SBM Technology

35,000t FPSO topsides enabled by SBM Offshore Technology
**TECHNOLOGY DEVELOPMENT**

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<td>Internal Turret</td>
<td>Turley</td>
<td>Deepstar</td>
<td>CALM Buoy</td>
<td>Delivery of the first Generic FPSO</td>
<td>Delivery of the largest Seastar™ TLP</td>
<td>New Build LPG FPSO</td>
<td>Deepest Semi-Submersible in the GoM</td>
<td>Offshore Offloading Line - Trelline™ Installed</td>
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### Maturing New Technology to Project Readiness

It is critical that all new technology is fully matured and qualified before being applied on real projects. Failure to do so could incur huge risks to project cost, schedule, performance and/or safety.

SBM Offshore has therefore implemented a process for Technology Readiness Level (TRL), which is an adaptation of the TRL process defined in API RP 17N (Recommended Practice for Subsea Production System Reliability and Technical Risk Management, 2009).

Using this process, new technology components and systems are matured through 7 stage gates from screening, validation and prototyping until considered sufficiently mature to be deployed on projects. After 3 years of successful operations, the technology is declared as mature (TRL7).

![TRL Diagram]

**TRL**

- **7** Proven in service for >3 years
- **6** System installed and operating
- **5** Execution of full scale project
- **4** System prototype / FEED
- **3** Component prototype / pre-FEED
- **2** Concept validation by testing
- **1** Concept proven by theory
- **0** Idea definition

Today, SBM Offshore’s innovation skills are as sharp as ever, and the company continues to invest heavily in order to create today the technologies which the industry will require tomorrow.
SBM’s dedicated laboratory in Carros, France, plays a key role in testing full scale prototype components, prior to reaching TRL 4.

A Global Technology Team

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