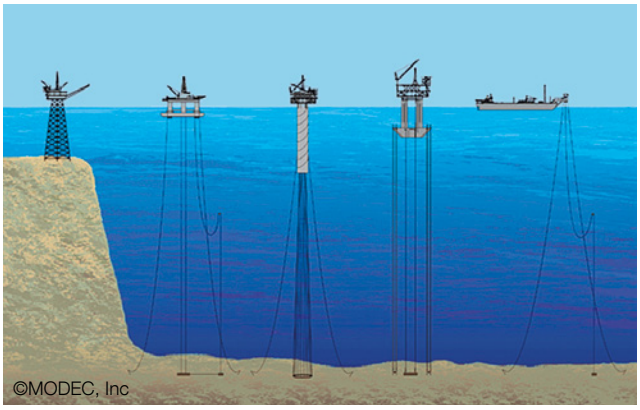
SULZER

Your Partner for Subsea Pumping

Our Experience Dedicated to Your Success

With the drivers of increased oil recovery and the depletion of traditionally accessible oil fields, the trend in oil and gas is turning towards the development of deepwater reserves. Exploration and production companies are pushed to drill deeper and further out into the sea, stretching the frontiers of oil exploration to the maximum.



©MODEC, Inc

Meeting the challenges of tomorrow

To cope with such a challenge, oil and gas companies have turned to subsea installations which offer not only accessibility to remote locations but also maximize oil recovery. In hostile and aggressive environments such as deepwater, pump equipment is subject to harsh conditions such as high pressure and high product temperature (HPHT). Besides the technical and operational challenges, the industry also faces environmental concerns and is striving to find more eco-friendly ways of exploring and producing. Thanks to its extensive expertise in the oil and gas industry, Sulzer is the right partner to find the most appropriate solution.

Sulzer, your pumping solution provider

With more than 180 years of experience, Sulzer has developed the technical, operational and safety expertise to provide the pumping system best fitted to our customers' needs. Through innovation and state-of-the-art technology, Sulzer is able to develop tailor-made solutions, taking into consideration stringent requirements of customers and the environment.

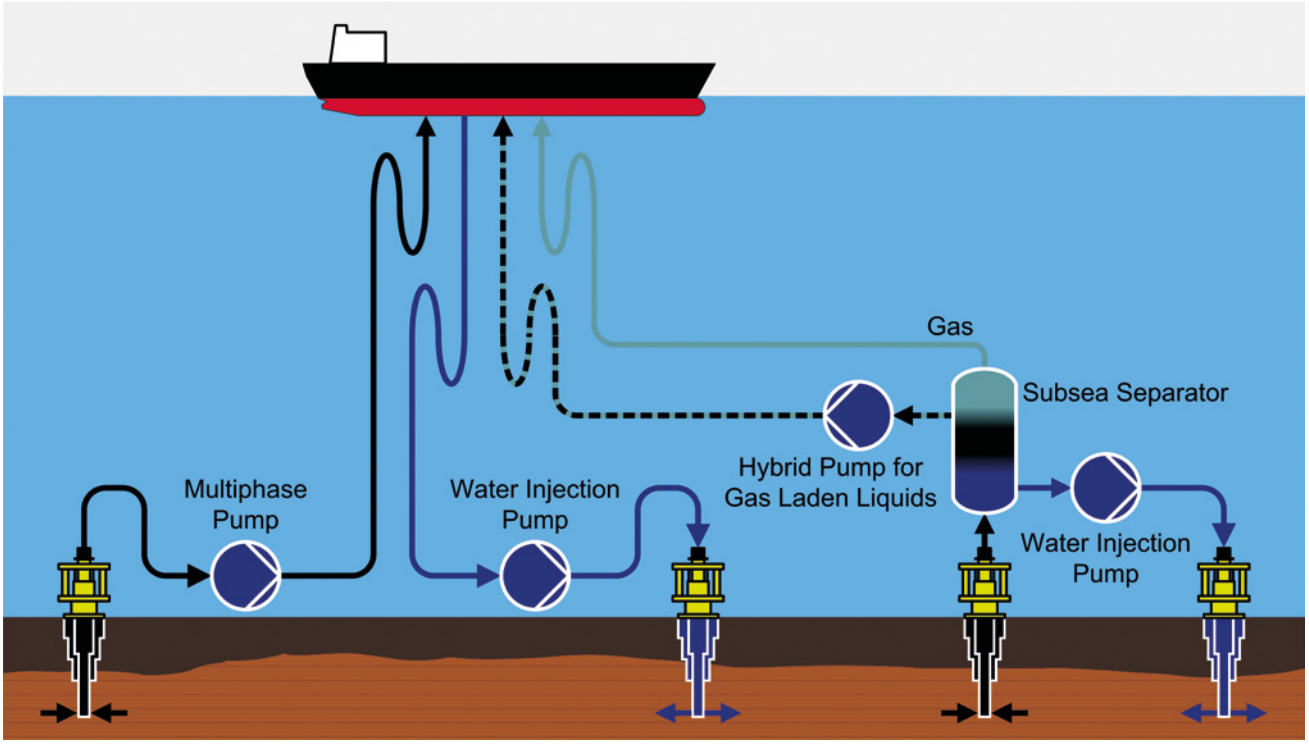
Sulzer is working together with its customers to:

- maximize the yield.
- prevent production stops by providing robust products.
- provide a reliable and efficient pumping solution.
- offer solutions which minimize the capital expenditure (CAPEX) payback period.
- keep maintenance costs to a minimum.
- enable production from tomorrow's oil fields today.

A Solution for Every Process

Sulzer's portfolio of subsea solutions meets application needs for flow line boosting of multiphase effluent directly from the well, single-phase duties including water injection or oil transport, and low gas carryunder applications, such as oil transport after subsea separation.

Sulzer subsea pumping applications



Design Features and Benefits

FEATURES AND BENEFITS

Permanent magnet rotor/stator arrangement with large fluid gap	▶	Faster speeds, higher power and greater efficiency
Balance drum	▶	Enables high boost pumping
Barrier fluid pressurizing system	▶	Mechanical system improves reliability and reduces capital and operating expenditures (CAPEX and OPEX)
Mechanical seal design	▶	Ensures stability in changing conditions
Single environmentally friendly barrier fluid for mechanical seals, bearing and motor	▶	Simplifies topside maintenance/ operation control protocols and reduces operating costs
Pump and motor equipped with journal and double acting thrust bearings	▶	Rotor systems are fully independent, thus ensuring long-term, predictable rotordynamic performance
Selection of field proven hydraulic profiles	▶	Allows sizing to the specific pumping application
Modular construction	▶	Improved design time for faster delivery
Available in Full Super Duplex or Low Alloy Steel with Inconel 625 overlay	▶	Metallurgy to match field requirements and project material selection philosophy
Fully optimized pull-out cartridge	▶	Reduced maintenance turnaround

OPERATING PARAMETERS

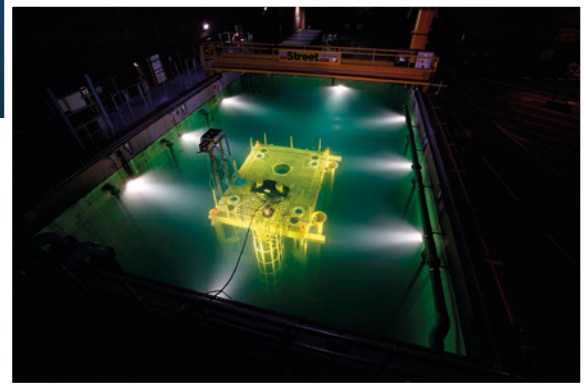
Water depth	up to 2,000 m / 6,562 ft
Design press. internal	up to 345 bar / 5,000 psi
Design press. external	up to 250 bar / 3,625 psi
Hydrostatic test press.	1.5 x internal design pressure
Design temperature	80°C / 176°F
Sea floor temp.	4°C / 39°F, no current assumed
Speed	up to 6,000 rpm
Motor shaft power	up to 3.2 MW / 4,300 BHP

A Fully Tested Solution

To completely validate the hydraulic, mechanical and electrical performance of the pump unit, each Sulzer subsea pump is string tested in our custom-built 1,500,000 liter capacity test pool. The size of the test pool ensures even the largest subsea pump test can be accommodated.

Detailed operation and conditional monitoring of the closed loop and pump is done from Sulzer's bespoke control room. A dedicated, variable-frequency drive allows subsea factory acceptance tests to be independent of other product testing resulting in a minimum lead-time and removal of test program bottlenecks.

During all factory acceptance tests, additional instruments that are not currently qualified for subsea applications are fitted to the machine. The extra instrumentation provides maximum confidence and proof that the Sulzer subsea pump will perform as intended without potential for long-term problems.



www.sulzer.com