OneSubsea
A Schlumberger Company

MARS

Multiple application reinjection system

FEATURES AND BENEFITS

- Offers flexibility in the technology applied to optimize production over the life of the field
- Enables low-cost, low-risk well interventions
- Allows for cost-effective subsea processing solutions
- Enables single-well fluid injection treatments, reducing deferred production
- Enables seamless integration of OneSubsea metering, pumping, and flow assurance technologies and solutions

OneSubsea also offers a MARS system injection choke.

Unique technology, universal application

The MARS* multiple application reinjection system technology comprises a patented insert design that effectively replaces a conventional production choke insert in the subsea tree. The system creates an access pathway to the production flow, thus establishing an intrinsically safe flow path to the tree, and enabling various production, processing, and injection technologies to be easily added at any time during the life of the field—all without needing to modify the tree or field architecture.

Amassing a global track record

The flexibility and multitude of subsea processing and production enhancements that the MARS system provides have benefited offshore operators around the globe. As of December 2015, more than 130 MARS system units had been installed in both brownfield and greenfield operations in most subsea regions around the world. The MARS system can help extend the production life of your subsea asset, with a wide array of low-cost, low-risk, and safe intervention operations.

General System Specifications

Metric	Requirement
Rated working pressures, psi [bar]	Up to 15,000 [1,034]
Water depth, ft [m]	To 9,843 [3,000]
Architecture interface	Subsea choke, multibore hub, and manifold
Product specification level	API 6A PSL 3 and 3G; API 17D
Material trim level	Up to material class HH

The MARS system enables the retrofit of a variety of production-enhancing technologies. This particular module was deployed onto existing wet subsea trees, enabling subsea multiphase pumping.

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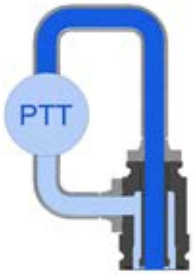
Brownfield retrofits

The MARS system dual-bore configuration enables integration of subsea production-boosting and processing technologies in the subsea architecture of all configurations. This technology has provided unique solutions to rectify production difficulties experienced throughout the subsea arena.

Applications potential:

Subsea sampling

Separation



Sensor replacement

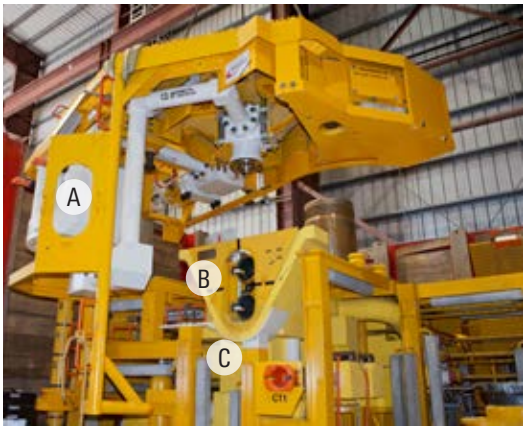
HIPPS

Sand filtering

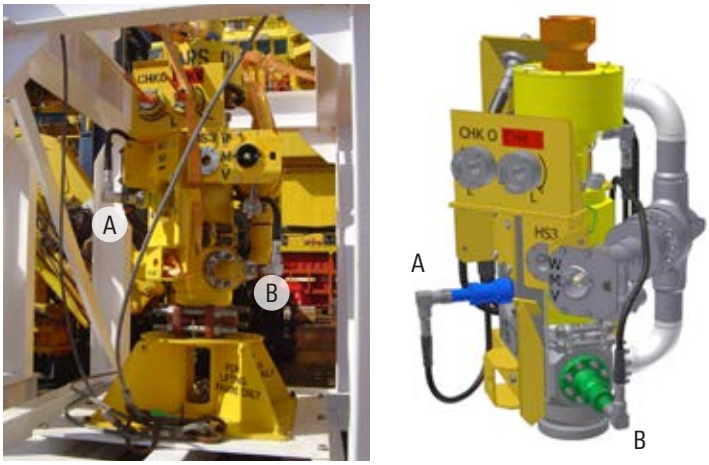
Process metering

Water injection pumping

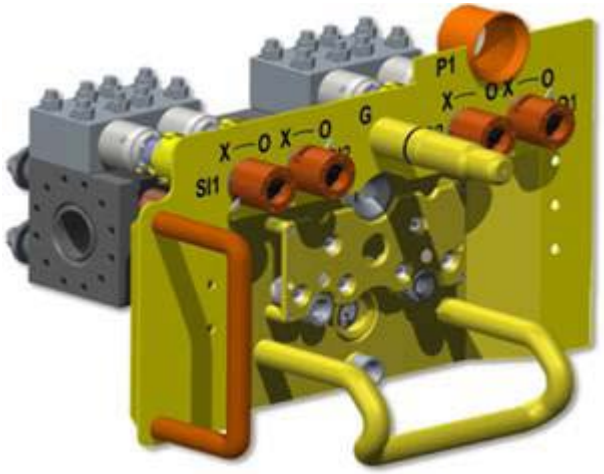
Multiphase pumping



MARS system technology enabled the brownfield retrofit of a multiphase flow meter on a subsea tree.



MARS system technology enabled the retrofit of new pressure and temperature sensors on a producing subsea tree.



MARS system technology can enable the retrofit of a sampling interface onto existing trees.

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Greenfield applications—retrievable process modules

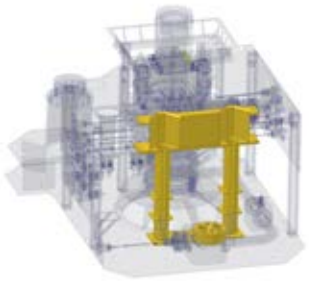
MARS system retrievable process modules (RPMs) are configurable modules that are engineered so the functionality can evolve to support changing well conditions and allow for module configuration to project-specific requirements. The standardized interface between tree and RPM allows the two to be designed and manufactured in parallel for improved schedule and interchangeability. Additionally, the RPM can be located on the tree or manifold.

RPM functionality:

- Chokes (production/water injection/gas lift)
- Fluid intervention
- Process flow metering
- Sensors
- High-Integrity Pressure Protection System (HIPPS)
- Sampling

RPMs provide the flexibility to change tree functionalities over the full life of the field.

One standardized interface enabling a range of functionalities over the life of the field



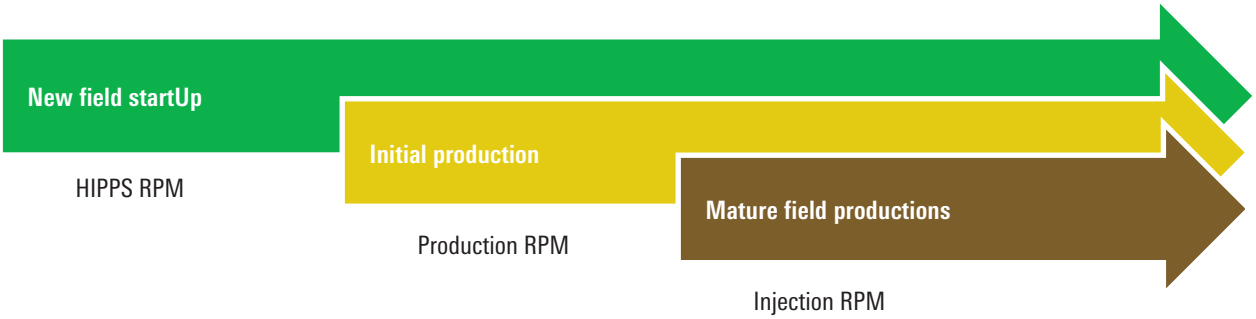
RPM standard tree interface

HIPPS RPM

Production RPM

Production with sampling RPM

Fluid intervention RPM



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Fluid injection applications

The MARS system single-bore configuration enables intervention applications that include injection of flow assurance chemistries into the production stream via the choke body on the subsea tree.

The system has a proven track record of delivering injection systems to clients globally in shallow-water and deepwater applications, deployed via support class vessels as opposed to high-cost rig vessels.

Applications enabled:

- Scale squeeze
- Acid simulation
- Flushing
- Well kill
- Abandonments
- Hydrate remediation

MARS system injection choke inserts

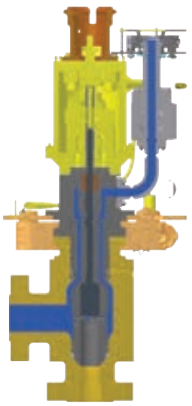
- The permanent MARS system injection choke replaces the existing tree production choke to provide a conduit between an injection hub and the wellbore. It also retains all standard choke functionality.
- The chokes are used on existing or newly designed subsea trees to provide an injection point for scale squeezes, flow assurance chemistries, or raw seawater.

MARS system injection inserts

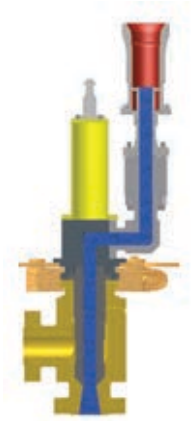
- Rental MARS system injection inserts are available to match corresponding tree/choke interfaces to provide a short-term connection point for various injection applications, including well kill, hydrate remediation, and flowline flushing.
- The inserts are utilized in the subsea modular injection system (SMIS).

Fluid injection system during operations in West Africa

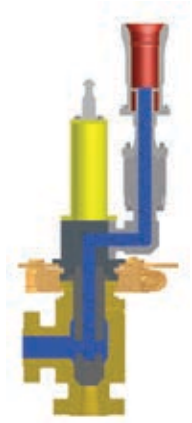
Subsea modular injection system (SMIS)



Section view of MARS system permanent injection choke



MARS system injection insert (flowline flow path)



MARS system injection insert (wellbore flow path)

MARS system permanent injection choke

MARS system rental injection insert

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