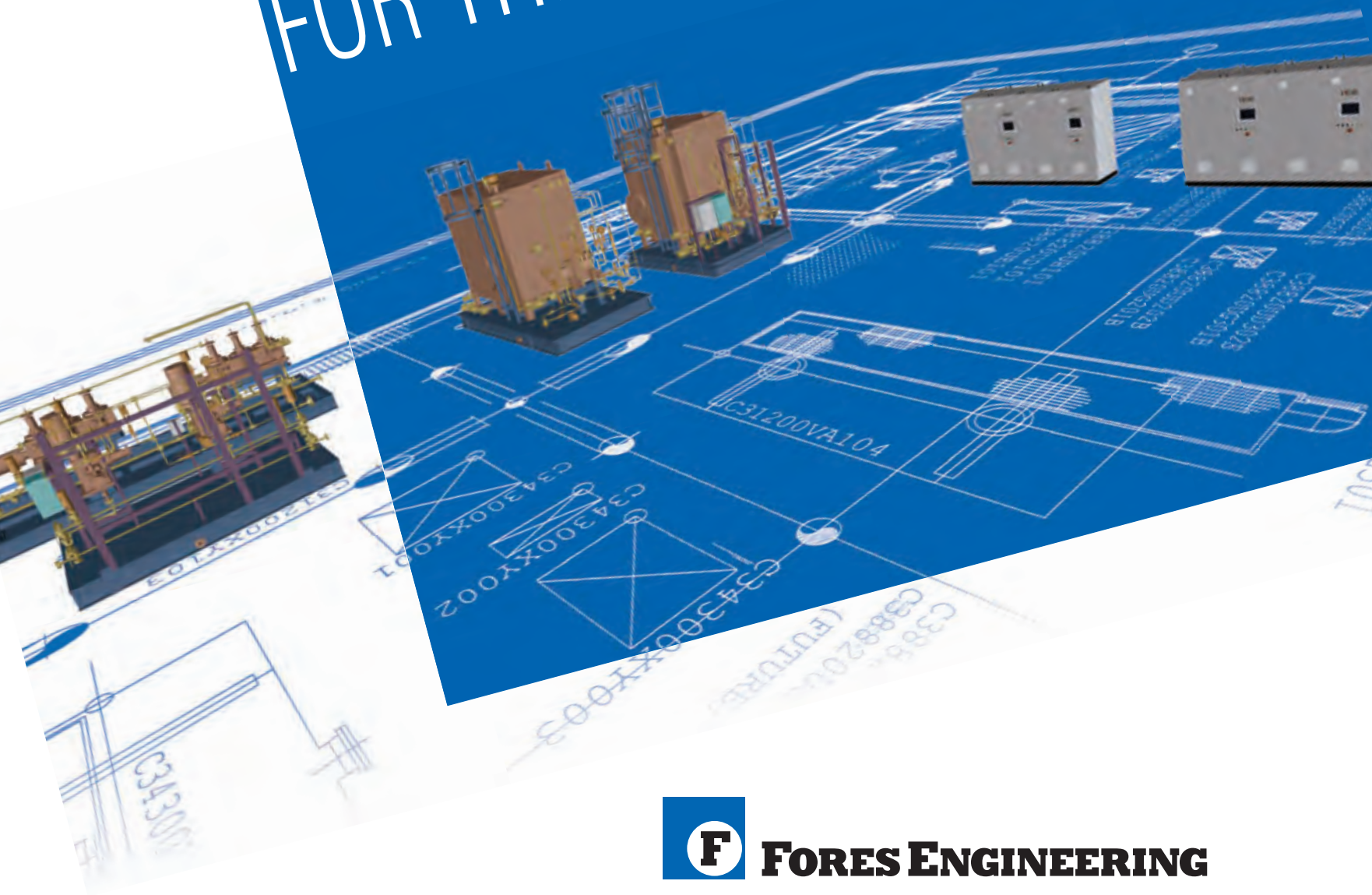


ENGINEERING INTEGRATION CONSTRUCTION AND SERVICES SYSTEMS FOR THE OIL&GAS



FORES ENGINEERING



ROSETTI MARINO
Group of Companies

SKID & PACKAGES

Fores Engineering designs, procures, constructs and supplies a complete array of customized **Skid & Packages** including:

- WHCP / HPU** – Wellhead Control Panel / Hydraulic Power Unit
- TUTU** – Topside Umbilical Termination Unit
- LCP** – Local Control Panel

Chemical Injection System

Fuel Gas Skid
Diesel Skid

Firefighting and Deluges

Metering System
Pressure Reducing Station

Analysis System
Sampling System

Integrated Skid

Subsea:

- > **HPU / Chemical**
- > **TUTU** - Topside Umbilical Termination Unit
- > **SUTU / SDU** - Subsea Umbilical Termination Unit / Subsea Distribution Unit
- > **PLET / PLEM** - Pipeline End Termination / Pipeline End Manifold
- > **SCM** - Subsea Control Module (under development)

from initial sketch
to the delivered
Complete Skid
Fores is Your Turn-key
Solution Partner for
your Multidisciplinary
Skid / Package



360° Project
Follow-up Design,
Procurement,
Configuration,
Construction,
Integration, Test,
Commissioning,
Startup and
After Sales Services

Global 24/7
Commissioning,
Maintenance,
Consultant Technical
Service
whenever you need

Thanks to almost 25 years of experience with more than 2000 Skid & Packages delivered worldwide, internal multi-disciplinary knowledge, engineering capability, Fores is the perfect partner for top-quality, reliable and high-performance Multidisciplinary Utility Systems / Skid / Packages:

- > Design and supply in accordance with client specifications, international standards (such as ASME, API and ATEX) and local regulation
- > Design for reliability and easy maintenance in extreme harsh conditions that could be found in oil & gas industry (offshore and onshore)
- > Design according Customer space constraint with 3D modelling
- > Optimized integration of the complete system from tank to pumps, from instrumentation to accessories
- > Advise effective solutions
- > Identify and analyze multiple solutions for best customer satisfaction
- > Global 24/7 Commissioning, Maintenance, Consultant Service whenever you need
- > Being vendor neutral and engineering driven, Fores, as system integrator has the excellent position to select the best solution in compliance with client requirements, balancing Customer Capex and Opex costs



WHCP/HPU

Fores Engineering designs, procures, constructs and supplies customized **Pneumatic and/or Hydraulic Packages** for a wide range of process oil & gas applications.

Wide range of **Technical Features** available for Customers::

- Different types of installations: Cabinet, Shelter, Rack, Module (suitable for integrated Skid with WHCP, Chemical, RTU, UCP, PAGA, F&G/ESD, Solar power, etc in one single skid)
- For low pressure application or very high pressure applications (FPSO Subsea)
- For every extreme harsh environment temperature conditions down to -45°C and / or up to -85°C

- Wide array of applications:
 - > WHCP (single module or multiple drawers type)
 - > HPU
 - > Separator Panels
 - > Master Panels
 - > LCP for SDV / BDV control / operation
 - > Workover
- Different material types
- Accumulator detailed sizing: bladder type, piston type
- Oil Pump detailed sizing: piston pump electrical driven or pneumatic driven



WHCP/HPU

- Oil Tank detailed sizing AISI316L SS material
- Hydraulic Circuit detailed sizing:
 - > Double ring compression fittings
 - > Coned&Threated fittings
 - > AISI316L SS material
 - > Exotic Alloy
- Electro-pneumatic / Hydraulic Components design: solenoid, pilot, dump valves
- With or without LCP (ATEX certified complete with SIL Rated Safety PLC): pneumatic logic and / or Safety PLC software logic
- With or without Fusible Plugs system and / or blow-out preventer devices

- With or without Solar Power System
- With or without HIPPS
- Instrumentation for local and / or remote indication
- Interface for remote management / monitoring (asset ICSS)

Fores is TUV certified
PED 97/23/CE MOD. H1 up to 690 bar
(ongoing certification for new 2014/34/EU).



Chemical Injection Systems

Fores Engineering designs, procures, constructs and supplies customized **Chemical Injection Systems** for a wide range of process oil & gas applications.

Wide range of **Technical Features** available for Customers:

- Three different types: Single Skid, Module (suitable for FPSO applications) or wheeled (mobile type)
- For low pressure application or very high pressure applications (FPSO Subsea Injection)
- Metering / Dosing pumps API 675 compliant (with stroke regulation)
- Reciprocating pumps API 674 compliant (with or without VSD)
- Double diaphragm, piston, plunger type pumps
- Centrifugal Pump ISO 2858 compliant
- Single-Head with IRCD or Multi-Heads Pumps
- Different material types: AISI316L, Hastelloy, Inconel, Super Duplex, Titanium, etc



Chemical Injection Systems

- Different type of chemicals including for example:
 - > Corrosion Inhibitor
 - > Emulsion Breaker
 - > Wax Preventer
 - > Methanol
 - > Glycol
 - > Biocide
 - > Sulfuric Acid
 - > Deoxidizer
 - > Sodium Hypochlorite
 - > Oxygen Scavenger
 - > Caustic Soda
 - > pH Builder
 - > Pour Point Depressant
- Adjustable flow rate locally or remotely
- With or without LCP (ATEX certified complete with motor starters and / or PLC)
- Flow, level and pressure instrumentation for local and / or remote indication.



TUTU – Topside Umbilical Termination Unit

Fores Engineering designs, procures, constructs and supplies customized **Topside Umbilical Termination Unit** to be connected to client umbilical and fully in compliance with all the requirements and specification.

Wide range of **Technical Features** available for Customers:

- Blast and fire resistant enclosures and cabinets available
- For every extreme harsh environment temperature conditions down to -45°C and / or up to +85°C
- Different material types.
- All materials selected to fit the requirements in terms of compatibility, design pressure, temperature and flow rate:
 - > Piping/Tubing
 - > Double ring compression fittings
 - > Medium Pressure/ High Pressure Coned & Threaded fittings
 - > AISI316L SS material
 - > Exotic Alloy
- Instrumentation for local and / or remote indication
- Electrical and Optical Junction Boxes for Fiber optic and cables distribution.



HIPPS

HIPPS system is a specific application of SIS (Safety Instrumented System) and is used in the Oil & Gas industry in order to provide protection for downstream equipment against overpressure or unsafe conditions coming from upstream.

For an HIPPS system is extremely important that the design is done according standards by a qualified and certified team that is not only expert in the system itself and his technology but has also a deep multidisciplinary knowledge of the Oil & Gas plant and experience in field installation, commissioning and startup.

Fores is the perfect Partner for the supply of these critical Safety Systems, witnessed by all major Oil & Companies that

relied with confidence to our Experienced TUV FS Eng. Team for the supply of HIPPS systems in their assets.

Our advantages against competitors is the complete design and construction of the entire HIPPS package according IEC 61508/61511 with the SIL level required (up to SIL4) by perfectly integrate each equipment part of the HIPPS system:

- Initiators: Safety SIL rated Pressure Transmitters
- Logic Solver: Safety SIL rated Controller
- Final Elements: Safety SIL rated Valves
- Piping and Skid structure
- Network and Power supplies
- Partial Stroke test facility
- All relevant detailed safety calculation and certification.



Fuel Gas

Fores Engineering designs, procures, constructs and supplies customized **Fuel Gas Skids** to treat natural gas for feeding electrical power generators.

Main Technical Features and Equipment:

- Gas flow rate: from 10 Sm³/h up to 190.000 Sm³/h and over
- Gas Scrubber
- Coalescing filters
- Electrical heater with relevant Control Panel
- Metering and pressure reducers
- Supervisory control based on PLC
- Valves, piping, instrumentation and accessories fully according to Client requirements and codes.



Diesel / Fuel Oil System

Fores Engineering designs, procures, constructs and supplies customized **Diesel Fuel Skids** for Diesel filtration for feeding diesel motors and emergency power generators.

Main Technical Features and Equipment:

- Diesel flow rate: from 1 m³/h up to 10 m³/h and over
- Diesel gear pump according to various standards (API 676, etc.)
- Particle filters
- Coalescing filters
- Valves, piping, instrumentation and accessories fully according to Client requirements and codes



Fire Extinguishing / Deluges

Fores Engineering designs, procures, constructs and supplies certified **Fire Extinguishing Systems** as stand-alone supplies and / or part of Integrated Supplies such as Shelters, Emergency Refuges, Revamping/Upgrading etc. Wide range of different **Fire Extinguishing systems and technical Features** available for Customers:

- Foam Systems
- Deluges Skids
- Clean Agent Extinguishing Systems
- CO₂ Extinguishing Systems
- Integrated with Certified SIL rated F&G / FAS systems and PAGA systems
- Integrated with visual and acoustic alerting devices
- Integration with existing Fire Fighting / Extinguishing plant system
- Complete detailed systems design and engineering according standards
- Fire Fighting Revamping / Upgrading: Complete detailed design and engineering
- Customized different types of installations.



Metering System / Let down Station

Fores Engineering designs, procures, constructs, configures and supplies complete Fully Integrated **Metering systems** for both gas and liquid:

- Meter Lines
- Analyzers
- Flow Computers
- Supervisory Systems
- Calibration and Testing Certification:
 - > Meter Prover & Water Draw Skid / Master Meter
 - > Calibration, Testing, Certification of Metrological Performance, witnessed by metrological authority
- After Sales Services:
 - > Site survey
 - > System verification
 - > On-site upgrade/modifications
 - > Re-certification
 - > Spare Parts Management
- Training

Being vendor neutral and engineering driven, Fores, as system integrator has the excellent position to select the best solution in compliance with client requirements, balancing Customer Capex and Opex costs. Wide range of **Technical Features / Services** available for Customers:

- Different Meter Types:
 - > Orifice (Junior / Senior)
 - > Ultrasonic (2-path / > 4-path / Redundant > 4-path)
 - > Coriolis
 - > Turbine
- Atex certified suitable for Hazardous area installation
- Complete with UCP, instrumentation and metering units
- Meters from all main manufacturers available in the market, including for example Daniel Emerson, Sick, Krone, GE, Micromotion
- Fiscal Flow Calculation, Data Storage, Reporting and Integration with Asset ICSS
- Flow Computers from all main manufacturers available in the market, including for example Daniel Emerson, Spirit, Omni, Krone.



Sampling System

Fores Engineering designs, procures, constructs and supplies customized **Automatic Gas Sampling Systems**, stand-alone type, suitable for offshore applications and for harsh environmental conditions.

Such Sampling Systems are used to extract samples at high pressure and temperature and collect them inside removable cylinders suitable for laboratory analysis.

Main **Technical Features** available for Customers:

- Sampling Systems Cabinets, thermal insulated, in AISI 316 material (1.5 mm thick.)
- Valves, tubing and fittings in Inconel 625 material, suitable for 10,000/15,000 PSI pressure range
- High pressure actuated inlet and outlet valves for leakage test (Inconel 625 material)
- Sample Cylinder with quick coupling connections, in Inconel 625 material (1l volume)

- PT and TT transmitters with seal separator and isolation manifold (NACE certified)
- MUD/trap KO drum, designed to remove the mud (if any) from the inlet gas sample:
 - > Design pressure: 10,000/15,000 PSI
 - > Design temperature: -36/+75°C
 - > Material: Inconel 625
 - > Inlet flow rate: 500 kg/h
 - > Mud density: 2000 kg/m³
 - > Gas density: 23/29 kg/m³
- SIL-Certified safety system, fully interfaced with the existing ICSS/DCS and with the following key benefits:
 - > High safety integrity
 - > High availability
 - > Low maintenance costs
 - > No single point of failure
 - > Comprehensive diagnostics
 - > Online repair
 - > Simple programming.



Analysis System

Fores Engineering designs, procures, constructs, configures, integrates and supplies a complete array of customized **Analyzers** including among others:

- Gas Chromatographs
- Sulfur Analyzers
- H2S Analyzers
- Moisture Analyzers
- Oxygen Analyzers
- Distillation Analyzers
- Oil in Water Analyzers
- Liquid Analyzers (ammonia, chlorine, etc)
- CEMS Analyzers

Being vendor neutral and engineering driven, Fores, as system integrator has the excellent position to select the best solution in compliance with client requirements, balancing Customer Capex and Opex costs.

Wide range of **Technical Features / Services** available for Customers:

- Installation: rack mounted, cabinet and / or shelterized with forced ventilation HVAC, F&G, Extinguishing system
- Fire resistant blast-proof certified by third party authority
- Sampling & Pre- Conditioning detailed engineering
- Different Material from AISI316L SS to Exotic Alloy
- Atex certified suitable for Hazardous area installation



Analysis System

- Analyzer equipment from all main manufacturers available in the market, including for example Yokogawa, Emerson, Siemens, ABB, Mitchell, Ametek, Teledyne, etc
- Analyzer Management and Data Acquisition System AMADAS Integration

Fores Advantages over competitors, thanks to the unsurpassed extensive technology knowledge of our Analysis Team:

- Advise and suggest customer for Better Analysis Solutions based on project requirements for better Capex-Opex reduction – advise for different technology with same or better features
- Select proper Manufacturer of Analyzer Required for better installation cost optimization.



Integrated Skid

Fores Engineering designs, procures, constructs and supplies customized **Integrated Skids** for a wide range of process oil & gas applications whenever space is an important customer constraint.

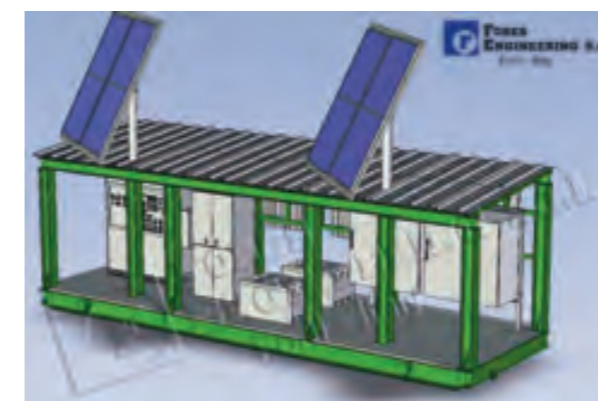
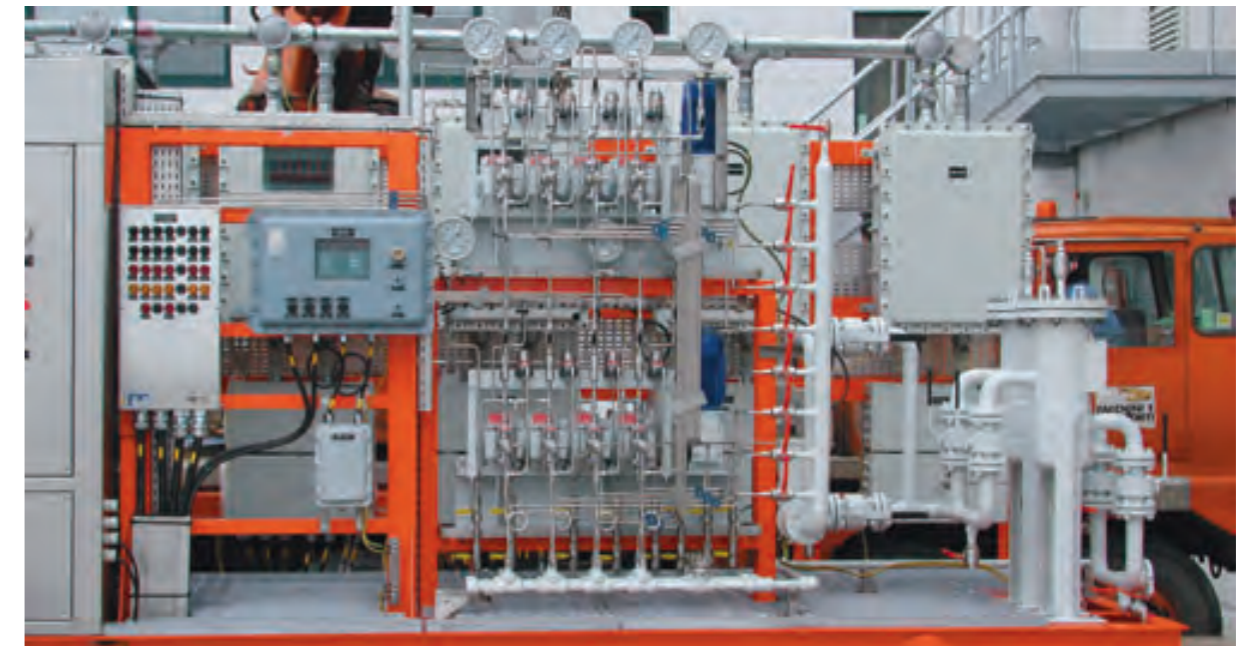
Fores is specialized in the supply of ready to use **Multipurpose Integrated Skid Solutions** equipped with all packages necessary for wells production within the same structure frame (integration of different sub-systems into one skid mounted package):

- WHCP / HPU
- Chemicals
- HIPPS
- Process Flowlines
- Instrumentation

- Certified SIL rated Safety System (Shutdown and / or F&G systems)
- Control system PLC based for packages and instrumentation / valves monitoring and management
- RTU
- Telecom Systems: networking, Radio, PAGA, etc
- Communication Interface with Asset ICSS for remote management and monitoring through asset SCADA system
- Flow Metering
- Electrical Power Distribution / Solar Panel System / Backup Batteries
- Certified ATEX for hazardous area
- Fully tested and commissioned before shipping for fast integration and with minimal interfaces on-site
- Best solution for operating / maintenance cost reduction
- Integration, Installation, configuration and test by Fores worldwide



Integrated Skid



Subsea HPU/Chemical / TUTU

Fores Engineering designs, procures, constructs and supplies customized **Chemical Injection Systems, Pneumatic and / or Hydraulic Packages** also for subsea applications, assuring the same technical features of the Chemical Injection System and HPUs designed for the topside installations.



SKID & PACKAGES

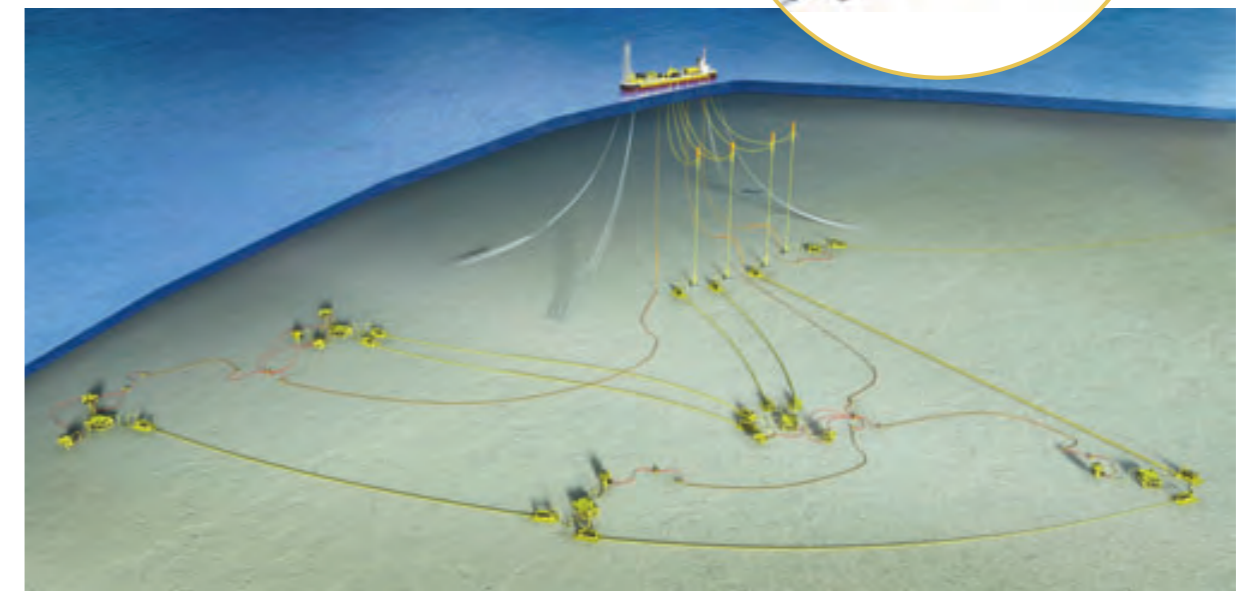
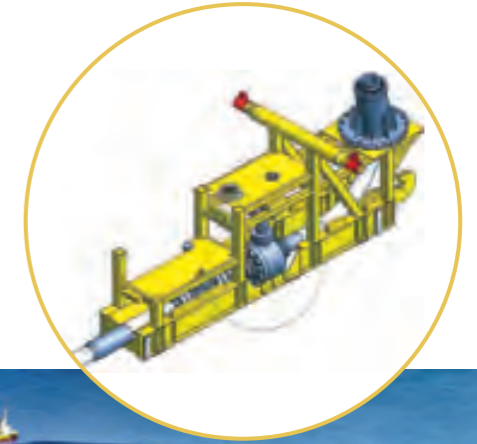
Subsea SUTU-SDU & PLET/PLEM

Fores Engineering is able to designs, procures, constructs and supplies customized **Subsea Equipments such as SUTU / SDU and PLETs / PLEM**s fully in compliance with all the requirements and specification.

- Painting and coatings as per subsea standards
- EDB (Electrical Distribution Box) fixed or movable
- Hydrostatic test.

Wide range of **Technical Features** available for Customers:

- Engineering developed by Fores to meet Customer requirement and to allow quick and reliable installation
- Simple ROV interface
- Reliable connector
- Components selected to resist to the most harsh subsea environment
- Full and extensive FAT available at our facilities to ensure the quality of the supply
- All materials selected to fit the requirements in terms of compatibility, design pressure, temperature, flow rate and resistance to the environment conditions



SKID & PACKAGES

Subsea SCM (under development)

Fores Engineering is designing a new **Subsea Control Module** able to satisfy Clients requirement.

Wide range of **Technical Features** available for Customers:

- Available on 2017
- SEM Standard Communication Protocols
 - > Modbus TCP
 - > Redundant copper DSL
- SEM Fast Redundant Communication
- SEM RS232 – RS422 – RS485 serial ports available; CAN bus available
- ISO/DIS 13628-6
- Open System
- Easy Integration with Topside ICSS
- 30 Functions.

