SUBSEA



FET SUBSEA TECHNOLOGIES VEHICLES, PRODUCTS AND SERVICES







Introduction

FET (Forum Energy Technologies) is a global company, serving the oil, natural gas, industrial, and renewable energy industries. FET provides value-added solutions that increase the safety and efficiency of energy exploration and production. We are an environmentally and socially responsible company headquartered in Houston, TX with manufacturing, distribution, and service facilities strategically located throughout the world.

FET has assembled some of the best brands in the industry. The company's products, designed to solve customer challenges from the sea floor to refinery, include drilling equipment and spare parts, valves and flow control equipment, subsea Remotely Operated Vehicles (ROVs), surface production process equipment such as separators and pressure vessels, and pipeline equipment and applications.

FET's experienced employees are dedicated to helping customers improve safety and performance while optimising their operating costs.

Forum Subsea Technologies is a leading provider of subsea related products and services. FET's extensive product line focuses on remote intervention technology with the capability to provide everything from a world class subsea trencher to tooling and individual components such as thrusters.

The Perry[®] and Sub-Atlantic[®] range of Remotely Operated Vehicles (ROVs), tether management systems, tooling and components is one of most comprehensive and highly rated in the industry.

Other subsea technology products include Dynacon winches, launch and recovery systems (LARS); VMax[™] simulation software and VisualSoft data acquisition software.

FET's subsea engineering expertise is enhanced by its renowned range of Moffat products including their renowned range of hotstab equipment, subsea pig retainers and surplussing check valves.

Smart Solutions. Powerful Products.



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FET Overview

Core Values



No one gets hurt

The safety of our employees and customers is our first priority coupled with a healthy respect for the environment.



Integrity

In everything we do, in every interaction, both internally and externally, we strive to operate with the utmost integrity and mutual respect.



Customer focused

Our products enhance our customer's performance and we listen to their needs and work with them to solve their challenges.

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Good place to work

We are committed to creating a workplace that fosters innovation, teamwork and pride. Every team member is integral to our success and is treated equally and fairly.

FET GROUP PRODUCTS & SERVICES

Smart Solutions. Powerful Products.



- Wrangler[™] Catwalks and Roughnecks
- Blohm + Voss Floorhands[™]
- Tubular handling tools
- P-Quip[™] mud pump accessories
- Offline activity cranes
- Drilling consumables
- Transfer bridges
- Mud transfer pumps & parts
- Drill floor instrumentation
- Wash pipe assemblies



Surface Production Equipment

- Separators
- Pressure vessels
- Skidded process units
- API tanks

Subsea Technologies

Vehicles

- Work-Class ROVs
- Observation-Class ROVs
- Trenchers
- Tether Management Systems
- Life Extension (LEXT)
- ROV Components
- Subsea Tooling
- Submarine Rescue Vehicles

Products and Services

- Digital Video and Data Acquisition
- ROV Simulation
- Launch & Recovery Systems
- Engineered Flow Equipment



Health Safety and Environment

Our HSE Vision

Forum Energy Technologies is committed to protecting the health and safety of our employees, our customers, and preserving the environment in the communities where we do business. We take personal responsibility for our safety and personal ownership of our impact on the environment. FET strives to continually improve our HSE process to achieve an incident-free workplace.

At FET we believe that all injuries and accidents are preventable. Every employee is responsible not just for their own safety but for the safety of their co-workers. Our goal is to develop a culture where making safe and environmentally conscious decisions is an everyday behaviour for all employees.

Our HSE Principals

- Value human life above all else and mitigate risks accordingly
- Comply with all HSE laws and set higher standards for ourselves when unacceptable risks are identified
- Maximise transparency reporting by accurately measuring and analysing our performance
- Do not compromise HSE for the sake of profit or production
- Become actively engaged in the communities where we do business
- Promote sustainable development by incorporating social responsibility, environmental renewal, and economic growth in our decision-making process
- Hold all employees accountable for implementation of our HSE Vision and Principles

Intervention Products

- Coiled tubing strings
- Coiled tubing BOPs
- Wireline BOPs
- Intervention accessories
- BOP refurbishment / recertification.

Up/Mid/Downstream Infrastructure Equipment

- Gate, globe and check valves
- Ball valves
- Specialty pipeline equipment
- Edge[™] desalting equipment

Land Drilling Products

- Wrangler[™] Catwalks and Roughnecks
- B&V Floorhands
- Tubular handling tools
- Drill floor instrumentation
- Mud transfer pumps and parts
- Drilling consumables

Well Construction & Completion Products

- Davis-Lynch completion tools
- Extended reach flotation equipment
- Stage cementing tools
- Production Packers
- Downhole protector systems
- ProDrill composite plugs

Stimulation Products

- Coiled tubing strings
- Fluid end assemblies
- High pressure flow iron
- Manifold trailers
- Refurbishment / recertification services



Subsea Technologies Overview

Forum Subsea Technologies is a leading provider of subsea related products and services. FET's extensive product line focuses on remote intervention technology with the capability to provide everything from a world class subsea trencher to tooling and individual components such as thrusters.

Products and Services

Moffat Subsea Engineering

- Moffat Hot Stab Assemblies
- Suction Pile Vent Hatches
- Moffat Surplussing Check Valves
- Wide variety of bespoke engineering



VMAX[™] Subsea Simulation

- Cutting edge simulation technology providing ROV and full-field visualisation solutions
- Virtual System Integration Testing (vSIT) tools for operation assessment
- Used by clients globally for in-house engineering studies



Dynacon Launch and Recovery Systems

- ROV winches
- Launch and recovery systems
- A-frames and docking heads
- Heave compensation systems



VisualSoft[™] Survey and Inspection Software

- Multi-channel video acquisition
- Logging, eventing and processing of pipeline data
- Synchronised video and graphical display of data



Custom Solutions

ROVDRILL[™]

- Deepwater geotechnical investigation
- Proven technology
- Highest quality sample and analyses
- Takes your soil laboratory to the seafloor



Manned Submersibles

- 20 Person Capacity
- Up to 600m Depth Rating
- Lloyds Classification



Vehicles

Perry Work-Class ROVs

- Leading supplier of deepwater work-class ROVs
- Over 100 XLX vehicles in operation worldwide
- Highly reliable
- Advanced Component level diagnostics
- Robust frame design
- Ease of operation and maintenance
- World-class service and technical support

Tether Management System

- Top Hat and Garage designs
- Industry benchmark
- Excellent reputation
- Extreme reliability
- Propulsion options
- Observation and Work Class solutions
- Up to 15000kg SWL and 9000kg TFL
- Specified by contractors and other manufacturers

Tooling Products Sales

- An unparalleled and unrivalled suite of subsea tooling products
- Wide range available off the shelf
- Continuous research and development of new and ground breaking subsea tooling
- Custom engineering applications



Sub-Atlantic Observation ROVs

- Innovative design
- Straightforward, intuitive diagnostics
- Broad range of tools, skid and customer specific accessories



Perry Trenchers

- World's leader and best in class Trenching and cable maintenance technology
- Industry benchmark in design, reliability and effectiveness



 Buried much of the subsea flow-lines in the world

Perry / Sub-Atlantic Components

- Recognised industry standard in propulsion, valve packs, compensators and subsea motors
- Built to the highest levels of technology, expertise and innovation















With our spread of facilities around the globe it means clients can reach FET in a location and time zone to suit their own project location. All FET product and business lines provide a customer support service tailored to their client's needs.

Whether this is by phone, e-mail, an online support portal or simply regular technical bulletins, FET will ensure it deals promptly and professionally to resolve any issues as well as providing technical support and emergency parts sales. All contact details are on our website: www.f-e-t.com





Work-Class ROVs



FET is the leading supplier of Work-Class ROVs, providing innovative solutions for challenging deepwater intervention operations. Perry products are known worldwide for unrivalled quality and technical excellence with a wealth of experience, delivering products that perform reliably in hostile environments.



Perry Work-Class ROVs continue to evolve as new technology and development are made available. By focussing on evolution rather than revolution, risk has been minimised in many areas by using proven technology with excellent reliability, whilst building on industry leading performance.

With facilities and experienced personnel in the UK, US, Brazil and Asia, FET is able to offer operators of Perry Work-Class ROVs an unrivalled support service.

Each client can be provided with a suite of bespoke support services to assist in the successful delivery and commissioning of their equipment and thereafter, throughout the operational life of the system. FET's operation and maintenance practices are designed to enable clients to take advantage of the full capabilities of the vehicle systems.

Post-delivery support and maintenance is available as follows:

- Availability of spares parts from each of our global locations
- Dedicated technical support available 24/7
- Equipment training at any FET facility or at client locations
- Field service technicians to assist in mobilisation, offshore maintenance or repairs
- Access to experienced product and project engineering resources and expertise





Features

- Modular, compact and extremely capable control system
- Rationalised hydraulic power unit, easily removed with minimal pipework
- Integrated compensators
- Increased available space for project specific ancillary equipment
- Incorporation of thruster feedback for precise closed loop control
- 3000kg underslung work-package capability
- Robust frame designs

Facilities

FET has taken the manufacture of remote technologies to the next level by creating a centre of excellence located in Kirkbymoorside, Yorkshire (UK). This is the world's only facility capable of manufacturing Observation Class ROVs, Work-Class ROVs and Trenchers all under one roof.

With a generous 6118 square metres of space, multiple ROVs can be built, integrated and tested in parallel.

Client training can be provided.

The indoor test pool measures 10m (L) x 11m (W) x 6m (D) which is capable of fully submerging and flying multiple ROV systems or complete trenchers.

FET's manufacturing facility boasts a full machine shop capabilities not only providing full control over lead-times but also guaranteeing quality and consistency.

- Standardised work-package attachment points
- Comprehensive data logging and diagnostics, board level status
- Elimination of pressure vessels
- Minimised electronics complexity by utilising backplane technology and allowing ease of user configuration Smart hydraulic manifolds
- Market leading power and communications for utmost flexibility and capability



Specification





	Perry XLX Evo Ultra Heavy Duty ROV system	Perry XLX-C Heavy Duty ROV system
Category	Hydraulic work-class	Hydraulic work-class
HP Rating	200hp	150hp/200hp
Depth Rating	3000m (4000m option)	3000m (4000m & 6000m option)
Dimensions (H/L/W(mm))	2282 / 3605 / 1905	1900 / 2800 / 1700
Payload	300kg	250kg
Through Frame Lift	3000kg	3000kg
Bolland Pull	1050kgf	800kgf
Features	Intelligent control systemIntuitive automatic control modes	Intelligent control systemIntuitive automatic control modes



Observation-Class ROVs



Sub-Atlantic[™] is the world's leading brand of Electric Observation-Class ROVs. With a range that extends from the portable and versatile Mojave to the powerful work-class Comanche, our electric ROVs have earned a reputation for quality, reliability, capability and performance.



Designed and built with the highest levels of technology, expertise and innovation, our Observation-Class ROVs operate in the world's harshest environments and perform a wide variety of underwater tasks. These tasks include observation, survey, Non-Destructive Testing (NDT), inspections and specialised tooling applications. Sub-Atlantic Observation-Class vehicles are recognised for their enhanced capabilities, made possible by a sophisticated control system and powerful thrusters.

Specification



	Mohican	Super Mohawk	Comanche
Category	Inspection	Inspection/Light Work	Work/Survey
Depth Rating	2000 - 3000m	2000 - 3000m	2000 - 3000 - 6000m
Maximum Payload	35kg	35kg	285kg
Dimensions (H/L/W(mm))	790 / 1100 / 800	850 / 1400 / 900	1250 / 2100 / 1300
Mass in Air	340kg	395kg	1130kg
Electrical Requirements	15 kVA 440 Vac 3-Phase+Neutral 50/60 Hz	15 kVA 440 Vac 3-Phase+Neutral 50/60 Hz	35 kVA 440 Vac 3-Phase+Neutral 50/60 Hz



Energy Transition

In addition to its traditional oil and gas offerings, FET also provides products and services for the renewable energy industry, particularly for offshore wind farm. The company's remotely operated vehicles (ROVs) are widely used in the maintenance and inspection of offshore wind farms. These vehicles are designed to be flown freely around the turbines and other structures, while being tethered to a surface support vessel.

FET has a global reach, with manufacturing facilities and service centers in the United States, Europe, and Asia. The company also has a strong commitment to sustainability, and is focused on reducing its environmental impact and promoting sustainable practices in the energy industry.





Trenchers



FET is the world's leader in best-in-class trenching and cable maintenance technology.



Features

Jetting tool

- Jetter arms with multiple depth options
- Deployment arm, with rotary joint
- Jet geometry maintained at all depths
- Individually controlled position
- Replaceable nozzles, various sizes
- Position and force sensors
- 400mm to 1200mm opening

Specification



	XT300/XT400/XT500
Category	Trencher
Depth Rating	3000m
Dimensions (H/L/W (mm))	3100 / 4200 / 3730
Rated Power	220kW / 300HP/400HP/500HP
Bollard Forward Pull	1100kg
Bollard Lateral Pull	1100kg
Bollard Pull Up	900kg
Control System	Perry ICE System



The Perry XT300 series continues as the market leader for cable maintenance vehicles. Compact in size, the XT300 is ideally suited to accommodate typically smaller vessels utilised by cable maintenance markets.

The Perry XT range of trencher vehicles are designed to meet the demanding trenching requirements of both strong soils and deep flowline burial protection over long stretches. Capable of operating in free-fly, skid-based trenching and survey modes, these vehicles represent extremely capable, high-performance product burial solutions.

From FET's Perry XT300 to the powerful Perry XT1500, these best-in-class vehicles have buried much of the existing subsea cable and pipeline that exists around the world today.

Long recognised as the industry benchmark for design, reliability and effectiveness, this line of trenchers continues to meet today's needs and tomorrow's evolving requirements. Perry XT range trenchers are designed for client specific and demanding applications, providing solutions even in the world's harshest environments.







ХТ600	XT1200	XT1500
Trencher	Trencher	Trencher
3000m	3000m	1500m
3300 / 5890 / 3600	3860 / 9400 / 6100	3860 / 9400 / 6100
440kW / 600HP	900kW / 1200HP	1100kW / 1500HP
2000kg	2000kg	2000kg
2000kg	2000kg	2000kg
3000kg	3000kg	3000kg
Perry ICE System	Perry ICE System	Perry ICE System





Tether Management Systems



FET continues to provide systems that have a reputation for extreme reliability and consistent performance in deepwater environments. Our Tether Management Systems (TMS) are unique and simple yet effective and have become the industry benchmark for reliability.



Specification









	Garage TMS 1	Garage TMS 2 Garage TMS 3 1		Top-Hat Type IV
Category	Observation ROV	Observation ROV	Observation ROV Light Work	Work-Class ROV TMS
Depth Rating	3000m	3000m	3000m	4000m
Dimensions				
Height (mm)	Max: 2031 / Min: 1,631	Max: 2403 / Min: 1923	Max: 3034 / Min: 2554	2018
Length / Width (mm)	1590 / 1074	1966 / 1288	2830 / 1664	N/A / N/A
Safe Working Load	2000kg	2000kg	3500kg	11000kg
Through Frame Load	500kg	570kg	2000kg	8000kg
Tether Capacity dialength	16.5mm - 385m	25mm - 200m	21mm - 750m 30mm - 300m	27mm - 750m 35mm - 440m
To Suit ROV	Mohican / Mohawk	Mohican / Super Mohawk	Comanche	As Required Work-Class



The Tether Management System stores and deploys the ROV tether cable so the ROV is decoupled from the surface vessel's motion and is able to operate at a larger radius. FET offers the complete range of both Top-Hat and Garage type systems for both electric observation class ROVs and hydraulic Work Class ROVs. Optional propulsion is also available on some models with thrusters fitted for even greater operating radius.

Despite the functionality of a TMS being simply to spool the tether on and off, historically a large proportion of recorded ROV downtime is attributed to TMS failures. To combat this, the FET range of TMS has been developed by experienced subsea engineers to create a robust design that provides consistent repeatable results at all water depths. With decades of experience, we have focussed on tether path geometry, tether load sensing and proportional speed controls resulting in increased reliability and higher capacity. The FET range of tether management systems simply work!





Top-Hat Type V	Top-Hat Type VI	Garage Type B	Garage Type C	
Work-ClassR OV TMS	ClassR Work-Class Flying Garage S ROV TMS for Work-Class ROV		Work-Class ROV GTMS	
4000m	4000m	4000m	4000m	
2204	2345	4125	4420	
N/A / N/A	N/A / N/A	4309 / 2516	4025 / 2420	
12500kg)kg 13500kg 12600kg		11500kg	
9000kg	Okg 9000kg		7500kg	
27mm - 1150m 35mm - 750m	27mm - 1150m 35mm - 1029m	27mm - 1150m 35mm - 50m	27mm - 1150m 35mm - 750m	
As Required Work-Class	As Required Work-Class	XLX Work-Class ROV	XLX-C Work-Class ROV	



ROV Components



You can rely on Forum Subsea Technologies for a full range of Observation and Work-Class vehicle integrated systems and components that are performance matched to meet your specific application requirements. Our global brands provide the quality, productivity and value to meet your toughest business challenges...and the capacity to exceed them.



FET Original Equipment Manufactured (OEM) Components are specified not just by operators of FET equipment but by other ROV manufacturers too.

FET's knowledge and expertise is utilised in the design of all our components ensuring they are suitable for the harshest of environments. This is why FET is the 'go-to' in the industry. FET's range of OEM components includes Compensators, LARS, Pan and Tilt Units, Valve Packs, HPU's, Thrusters and TMS. Many of these components are available in a range of sizes and configurations to suit client specific needs.

Electric Thrusters

- Proven reliability low parts usage
- Forward/reverse thrust within 5-10% band
- Quick-change seal cartridge
- Reliable ceramic sealing surfaces
- Easy to retrofit
- Direct Drive Reliability (no gearbox)
- Lightweight Design
- Various Connector Options



	Brushless AC				Brushl	ess DC		
Model	CTE-01 (Single)	CTE-01 (Double)	CTE-01 (Single)	CTE-01 (Double)	SPE-75	SPE-180	SPE-250	SPE-380
Propeller	150	150	178	178	144	178	246	385
Max. Bollard	29 (fwd) 26 (rev)	29 (fwd) 29 (rev)	45 (fwd) 36 (rev)	49 (fwd) 49 (rev)	264	5	100	220
Supply Voltare	440V 3 phase			300Vdc	300Vdc	600Vdc	600Vdc	
Weight (Air/Water)(kg)	8/5	9.3/6.4	12/8.1	14/9.2	3.3/2.5	5.9/3.8	13/8.4	42/25





Hydraulic Thrusters

- Proven reliability low parts usage
- Forward/reverse thrust within 5% band
- Quick-change seal cartridge
- Reliable ceramic sealing surfaces
- DNV GL witnessed performance
- Easy to retrofit
- 4 Standard propeller sizes



Compensators

- Four sizes 270, 370, 860 and 2700cc
- Level sensors available for all compensator sizes
- Thermoplastic construction
- Grade 316 stainless steel spring
- Adjustable pressure relief valve
- Low level proximity sensor option
- Mounting feet

Valve Packs

- 6, 8, 12 & 16 station versions
- Solenoid and/or proportional valves
- Wandfluh NG3 valve reliability
- Manual or proportional pressure reduction
- Externally adjustable low control
- Externally adjustable line relief
- Removable/configurable PO check valves
- Powerful serial control system
- Hardware or GUI control with diagnostics
- Pressure & water ingress sensors
- Tested to 6000m

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Model SA-PH30030 SA-PH38040 SA-PH42060 SA-PH500110 Propeller Dia. (mm) 300 380 420 500 Max. Bollard Thrust (kgf) 370 460 590 850 70 99 154 Max. Continuous Flow (Ipm) 56 Weight (Air/Water)(kg) 17.4/9.8 27/14 34/17 59/31

HPU's

- High reliability
- Output shafts at each end of motor
- 15 to 280 kW(20 to 375 HP)
- Industry proven windings
- 1800 rpm synchronous speed
- Water ingress and temperature sensors
- Various voltage options (3000 volts standard)
- Interface kits for a range of hydraulic pumps
- Motor options for pump drives with 3600 rpm shaft speed
- Efficient design requires no external cooler

Pan & Tilt Units

- 24 Volts DC, 110 Volts AC or Hydraulic
- High Torque versions
- Top mounting flange on pan shaft
- Low backlash
- Self-locking on power down
- Position feedback
- Adjustable limit switches
- Pressure compensated
- Tested to 6000m
- Serial or analogue control
- Various Connector Options









Life Extension (LEXT)

The FET ROV Life Extension (LEXT) programme provides to clients an Original Equipment Manufacturer (OEM) backed range of modification, refurbishment and upgrading services for existing fleet vehicles.





The work scopes undertaken by FET under the LEXT programme range from intensive equipment servicing, through obsolescence management and control system upgrade, to vehicle replacement.

FET applies its manufacturing expertise in planning and control to make sure each LEXT project is delivered as efficiently as possible and within a controlled budget. By choosing the FET LEXT programme, unforeseen and unbudgeted costs – often experienced with clients' own in-house alternatives – can be minimised. FET's LEXT programs will be undertaken using robust and clear contractual terms including the significant benefit of an OEM warranty against the work undertaken.





Subsea Tooling

FET provides an unparalleled and unrivalled range of subsea tooling products. With over 30 years' experience and knowledge in the remote intervention and subsea industry, FET supports its clients as a single source supplier of subsea technology.

FET's subsea tools are carefully designed to be operator friendly and fit for purpose. FET's in-house engineering team encompass all key disciplines including electronics, hydraulics and mechanical design which when combined deliver innovative and state-of-the-art tooling applications to the subsea world.

FET provides the most comprehensive range of standard subsea and ROV tooling. Supported by a global after sales support service, we have service centres in Houston, Brazil, Singapore and Aberdeen. By combining office based technical support with our field technicians FET are able to offer a comprehensive support service to our customers around the globe.

FET can supply highly skilled and qualified offshore tooling technicians to support operations. FET's tooling technicians complete many hours of in-house training competencies and qualifications to national and internationally recognised training schemes. Combined with their working knowledge of tools, they quickly become a great asset to project delivery teams.

Torque Tool

FET produces every interface in ISO 13628-8 and API 17H. From the largest Class 7 at 25000ft Ibs to Class 1 at 50ft Ibs FET torque tools are made for robust service, but built for consistent, accurate torque and speed delivery. Torque feedback options are available on most torque tools, as are a range of appropriate control manifolds and accessories.

Linear Actuator Override Tools

FET has developed a range of tools to operate various linear actuator override tooling valves in a range of different interfaces including ISO 13628-8 Type A, ISO 13628-8 Type B as well as various customer specific interfaces.

Deepwater Liftline Running Tools

Running tools for change-out of control pods and chokes can be supplied in versions for diver operation, direct hydraulic, fly-to-place, and lift line. FET supplies both ISO/API interface standards and client specials. FET provided the running tools and ROVs for the first diverless-operated subsea tree in the early 1990s and has pioneered many of the technologies now adopted as industry standard.

ROV Skids, BOP and TDU

FET designs and manufactures one of the most extensive range of ROV mounted skids in the industry. Compatible with all types of WROV, they can be configured to suit tasks such as survey, sampling, fluid and methanol injection, suction anchor installation and Flying Lead Deployment. They can be fitted with fixed and variable buoyancy, as well as our patented BOP actuator compliant with API standard 53. As well as skids, FET can supply Tool Deployment Units (TDU). A TDU fits to the rear of an ROV allowing the ROV to dock onto a subsea structure and facilitates the controlled deployment of tools.

Electrical ROV Tooling & Skids

FET can supply electric tooling and skids to enhance the operational capability of any ROV system including Inspection-Class and small Work-Class ROVs. Ranging from manipulator and pipeline inspection skids to electrical cleaning brushes and torque tool skids.













Digital Video and Data Acquisition



FET's VisualSoft is a market leading digital video data acquisition and processing system for survey and inspection of underwater assets.



The VisualSoft Suite is a modular range of software applications designed specifically for use during subsea structure and pipeline inspections. All software products are available with carefully specified and configured hardware solutions and FET offer the services of our skilled VisualSoft installation engineers to assist with mobilisation on vessels and at office locations.

FET's VisualSoft system was the first digital video system introduced into the offshore oil and gas industry. Since then FET has pioneered the introduction of new digital video formats into the subsea market allowing our customers to take advantage of the best available video quality and reliability.

FET's team of VisualSoft software developers focus on providing the most innovative, robust and user oriented products which are valued worldwide by clients.

FET's customer service for VisualSoft includes round the clock support and a range of training courses to suit client needs. FET has become a respected and valued partner to many of the world's subsea construction, survey and inspection contractors.

Key to the success of the VisualSoft system is the innovative way it allows clients to administer, manage and review video and data which they log during surveys and inspections, especially of large assets such as pipelines or jackets. The VisualSoft Suite provides multichannel video and data acquisition functionality which is time synchronised to allow simultaneous review of video and data for any logged event, position, component or time, quickly and efficiently.

Facilities

Dedicated training facility for Hardware and Data Processing in Aberdeen UK.



FET SUBSEA OVERVIEW





1. Acquisition (Online)



VisualDVR

- Recording of single or multiple channels of digital video
- Logging of events and anomalies
- Dynamic overlay



VisualDataLogger

- Logging of survey sensor data
- Logging of ROV position data
- Graphical data verification and alarms

2. Quality Control (QC), Eventing and Processing (Offline)



VisualEdit Professional

- Processing of data relating to ROV Position
- Processing of profile data relating to the pipeline and adjacent seabed



VisualEdit Eventing

- Editing and QC of events such as pipeline/structure features and anomalies such as freespans, anodes or debris
- Automated eventing feature

As well as being software for acquisition and archiving, VisualSoft provides a powerful software platform for offline processing of video and survey data. VisualEdit Professional is an automated data processing and data editing package which provides a fast and consistent method of processing survey data. VisualEdit Professional reduces the man-power required to process survey data and delivers a quality result that is repeatable and easily checked.

3. Reporting and Review



VisualReview

- Grab stills from video
- Grab survey data views to JPEG
- Search tool



VisualEdit

- Creation of pre-defined and bespoke client reports
- Export of data to client databases and software environments
- Pipesheet view for year on year comparison



ROV Simulation

FET's VMAXTM Project Simulator is designed to simulate subsea construction, intervention and inspection activities using ROVs. The VMAX software utilises an advanced physics engine which allows the application of realistic and accurate forces on the equipment and structures within the simulated scenario applications themselves.



VMAX simulators can be supplied as a full console system which provides a realistic training environment for new ROV pilots or for project specific rehearsals. A portable desktop console is also available for a cost effective alternative which can be mobilised easily from office to vessel.

VMAX simulators can be preloaded with a variety of generic training scenarios. However project specific scenarios can also be developed. This can be done either by using FET's team of in-house VMAX engineers or clients can use VMEditor scenario authoring software applications themselves.

The VMAX product range allows our clients to simulate complex subsea operations to a very high degree of accuracy either autonomously or in partnership with the VMAX engineering team.

Control of ROVs, manipulators and winches is extremely realistic as is intervention with simulated subsea hardware such as flying leads, ROV stabs and tools.

Our products are developed and manufactured at the headquarters in Houston and support for VMAX is provided globally through FET's regional offices. Support of licenses is done as part of a yearly renewal which entitles the user to perpetual software upgrades and access to new generic scenarios.

VMAX Full Console ROV Simulator

- Uses the latest Perry XLX-C and XLX-evo WROV console and high performance simulation PCs
- Configurable environmental conditions via instructor screen
- Provided with nine screen video wall
- Sonar and camera displays
- Cyber chair option
- Playback of simulator flights in VMAX Player (free download)

FET has a VMAX training simulator suite available for hire

VMAX VMEditor

- Allows customers to develop and modify scenarios
- Assets positioned by scripting or drag and drop
- Tools for defining collision geometry, mass and other physics based properties
- Provides rapid engineering analysis in a simulated offshore environment
- Solidworks[®] Importer add-on













Launch & Recovery Systems

DYNACON FET specialises in the custom design and manufacture of winches and handling systems. The Dynacon[™] product range offers some of the highest quality products available in the industry.



Since 1986 the reputation of providing ultra-reliable and robust equipment has made FET's Dynacon products the premier solution for offshore winches and handling systems.

Backed by experienced and dependable engineers and technicians, FET's Dynacon products are supplemented with services such as field technical support, system training, refurbishment and upgrade services. In addition to spare parts sales, our customer service professionals are available around the clock to get you back up and operating.

Facilities

FET's manufacturing facility for Dynacon products is located in Bryan, Texas, USA. A major expansion project in 2014 doubled the production area. Additions include a new assembly shop, an additional weld shop, a state-of-the-art blast and paint facility, and an increased testing area to supplement the in-house spooling and load testing facilities. With this expansion complete, FET is poised for quicker deliveries and augmented service capabilities.







Dynacon ROV Winches

- 5.8Te ROV Winch, Model 1216
- 9.5Te ROV Winch, Model 1102
- 12Te Heavy Duty ROV Winch, Model 521XL
- 12.7Te Heavy Duty ROV Winch, Model 1307
- 15Te Heavy Duty ROV Winch, Model 721XL

Standard Winch features

- 3G design parameters
- Fail-safe braking
- High tension termination
- Field swappable drums
- Grooved drum liner (Lebus shell)
- Conventional electroactive levelwind
- Drip pans
- Water-over-oil heat exchanger
- Integrated protection guards
- DNV GL certification

These standard features make FET's Dynacon systems workready without compromising reliability or safety.

Dynacon A-frame

- 5.6Te self-erecting a-frame, Model 1217
- 11Te self-erecting a-frame, Model 6023
- 12Te self-erecting a-frame, Model 9966
- 13.5Te self-erecting a-frame, Model 966
- 9.5Te telescopic a-frame, Model 1103
- 13.5Te telescopic a-frame, Model 1232
- 13.5Te telescopic a-frame, Model 1015

A-frame features

- 3G design parameters
- Self-erecting
- Failsafe latching assembly
- Cushioning snubber ring
- Rotating docking head
- Visual latching indicators
- Safety gates (per design)
- ROV tie down points
- Galvanised steel grating
- Fall arrestor pad eyes

Optional Features

FET's Dynacon products can be tailored to suit client's particular requirements. Examples are:

- Dual motor HPUs
- Zone II hazardous location HPUs
- Remote control packages
- Overhead right angle levelwind
- DNV GL lift certificate upgrades
- Multiple voltage input
- Stainless steel hose ends, fittings and/or quick disconnects
- Air-over-oil secondary heat exchanger

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- Umbilical cooling system
- Drum temperature monitoring









Engineered Flow Equipment



FET's Moffat subsea engineering business offers full design and fabrication services for a significant range of pipeline products aimed at the petrochemical, process, offshore, and subsea installations. FET's Moffat products have a class leading reputation with strong global client list to match.



Facilities

Our Sales and Engineering teams for Moffat products are based out of Prestwick, Newcastle Upon Tyne. FET's manufacturing facility for Moffat products is located in Kirkbymoorside, Yorkshire. The plant offers full in-house design, fabrication and testing services for a significant range of pipeline products aimed at the petrochemical, process, offshore, and subsea installations.

The plant has world class welding facilities, accredited to BS EN ISO 3834 Part 2. FET has a large library of pre-qualified weld procedures, qualified in accordance with all major oil companies' specifications. In addition FET regularly and consistently performs bespoke weld procedures for permanent and subsea works.

All welders are fully coded and can work with the materials and to the standards as follows:

- Material Grades: Carbon Steel, AISI 4130, S/ Steel 316L, Duplex UNS 31803, Super-duplex UNS 32760-32750, Inconel 625 & Nitronic 60
- Standards: ASME IX, AWS D1.1, BS EN 15614, BS EN 4515 PART 1&2 & DNV-OS-F101
- Processes: GTAW, SMAW, GSFCAW & SAW



Hyperbaric Testing

FET has a significant range of pressure testing facilities, including several segregated hydro test bays and a large hyperbaric test chamber, all calibrated to national standards.









Hotstabs

The Moffat Hotstab Connector is a compact, light and cost-effective connector that allows a hose to be connected / disconnected subsea. The product has been in service since 1995 and has been refined



and developed up until the present day as the demands of the subsea market have increased. It is now recognized by many operators as the 'best of breed' industry standard item for subsea pigging, chemical injection, gas injection, flooding and venting operations.

Pig Retainer

The Moffat Pig Retainer™ (sometimes known as a Pig Lock) provides a reliable mechanism to prevent pigs moving inside a pipeline during Pig Launcher / Receiver installation and removal operations. A high



yield pin is extended and withdrawn into the barrel by means of a Remote Operated Vehicle (ROV) rotary interface. This pin reacts against the nose of the pin to hold it in position during deployment or retrieval. Depending on the pig size, the pin can retain a pig under a differential pressure of up to 10 BAR.

Dual Position Hotstab

FET Moffat's Patented Dual Position Hotstab is a compact, lightweight and cost-effective solution for flooding operations. This tool allows the flooding and binding operation to be performed using only one receptacle and hotstab, without removing the hotstab or



requiring a blind stab. This reduces ROV and vessel time needed and eliminates the need for a blind stab, saving significant cost.

Suction Pile Vent Hatches

Suction Pile Vent Hatches are used to allow flow of sea water and air out of a suction pile during deployment at a controlled rate.

After the unit has reached the sea floor the vent hatch is closed so that the suction pile can be



depressurised to allow it to be 'sucked' and embedded into the sea floor.

Our Vent Hatch has been in service since 2004 and is refined and developed as the demands of the subsea market increase. Various different configurations are possible depending in the application required.

Sizes range from 12" to 40" Nominal Bore with pressure ranges of -145PSI to +145 PSI.

Surplussing Check Valve

Moffat Surplussing Valves[™] are a variable cracking pressure check-valve. They are a time proven solution in preventing the collapse of hoses due to external pressure.





Defence Products



With a proven track record in the defence market, FET is proud to be the manufacturers of choice by many of the world's military, naval forces and subsea product requirements.



Forum Energy Technologies (FET) is a world-leading designer and manufacturer of subsea vehicles and tooling. For more than 45 years FET has reliably supported military organisations and naval forces across the globe.

Since 1975 we have pioneered the development of manned submersibles. One previously delivered system includes the NATO Submarine Rescue System (NSRS) which entered service in 2008. NSRS is on constant standby for rescue operation in any part of the world and is specifically packaged for rapid deployment by air transport with its other surface elements.

Our latest SRV system (LR11) completed sea trials in 2021 and was built with full Lloyds class certification. The system was supplied with a Launch & Recovery System, a complete training & after sales support package as well as an ROV System, Simulator, ELSS Pod Skid & Mating Target.

We have successfully supplied defence equipment/services to NATO and the following countries: UK, USA, Australia, Ireland, Norway, Germany, Spain, China, Vietnam, Malaysia, Singapore and South Korea. We are proud to deliver cutting-edge technologies which are at the forefront of the subsea industry and remain the systems of choice by many of the world's military and naval forces.





Custom Products

Custom solutions can be provided from across the whole of the FET product range from specific subsea vehicles through to intervention tooling and bespoke buoyancy modules.

The mission-critical experience of our engineers enables them to design custom solutions for virtually any situation. Clients look to FET based on the proven experience that we can take on difficult challenges and deliver.

Development of custom and bespoke intervention tooling is a core service the FET provides to its clients.

As intervention and process control equipment become more sophisticated, advanced control systems are needed to collect and distribute the data to the end user. Integral to many of our custom solutions is the Perry control system technology which offers field-proven solution that can be configured to suit clients needs.

Example custom products include:

Rovdrill™

- Provides competent, accurate and reliable geotechnical services, through strong partnerships with well-respected FET brands and external industry specialists
- Viable technical and economic alternative to drillship and other seabed equipment and operations for gathering high quality seabed measurements and core samples
- Delivery and scheduling of Rovdrill and related services are client driven, rather than supplier driven, since Rovdrill utilises vessels and ROV systems of opportunity

Subsea Orientation Equipment System (SOES)

- Powered and controlled via Workclass ROV hydraulic and electrical connections at the stab plate
- At the heart of a new ship-based construction system conceived by Aker Solutions for the modular installation, intervention and recovery of well-head equipment offshore

Pre-heat System

Induction heating power and control system for diver hyperbaric welding of a live gas pipeline.

- This system provided the high voltage power and associated support equipment for the induction heating system of the Tampen tie-in project. The induction heating equipment was client provided from EFD.
- Key components supplied included: control software, surface control computer, power distribution panel & transformers, umbilical junction box, subsea umbilical and JB, control pressure vessel and sensors.









OUR CORE VALUES

No One Gets Hurt

The safety of our employees and customers is our first priority coupled with a healthy respect for the environment.

Integrity

In everything we do, in every interaction, both internally and externally, we strive to operate with the utmost integrity and mutual respect.

Customer Focused

Our products enhance our customer's performance and we listen to their needs and work with them to solve their challenges.

Good Place To Work

We are committed to creating a workplace that fosters innovation, teamwork and pride. Every team member is integral to our success and is treated equally and fairly.

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