Introduction

Forum Energy Technologies is a global oilfield products company, serving the subsea, drilling, completion, production and infrastructure sectors of the oil and natural gas industry. The Company's products include highly engineered capital equipment as well as products that are consumed in the drilling, well construction, production and transportation of oil and natural gas. Forum is headquartered in Houston, Texas, with manufacturing and distribution facilities located around the globe in areas that are strategic to energy exploration and production.

Forum 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.

Forum'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. Forum'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; VisualSoft data acquisition software and Syntech syntactic foam buoyancy.

Forum's subsea engineering expertise is enhanced by its renowned range of Moffat products including subsea pipeline inspection gauge (PIG) launch and recovery systems and subsea connectors.

everything remotely possible™
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## Vehicles

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Forum 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.

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.

Forum Group Products & Services
Smart Solutions. Powerful Products.

Offshore Drilling 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
- Digital Video and Data Acquisition
- ROV Simulation

Products and Services
- Launch & Recovery Systems
- Buoyancy
- Subsea Engineering
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. Forum strives to continually improve our HSE process to achieve an incident-free workplace.

At Forum 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
Subsea Technologies Overview

Forum Subsea Technologies is a leading provider of subsea related products and services. Forum’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
- Subsea and Topside Pig Launchers and Receivers (PLR’s)
- Moffat Hot Stab Assemblies
- Suction Pile Vent Hatches
- Moffat Surplusing Check Valves
- Wide variety of bespoke engineering

D-Pos Taut Wire
- Industry leading Dynamic Positioning (DP) peripheral sensor
- Designed to operate in water depths up to 400m
- Can be integrated into a wide range of DP systems

Syntech Buoyancy
- Standard and premium uplift buoyancy
- Ultra deep buoyancy
- Acoustic materials for underwater sound attenuators

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

Custom Solutions

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

**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

**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

**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

**VisualSoft™ Survey and Inspection Software**
- Multi-channel video acquisition
- Logging, eventing and processing of pipeline data
- Synchronised video and graphical display of data

**Submarine Vehicles**
- 16-18 man rescue capability
- Air transportable by Emergency Life Support Stores (ELSS)
- Ventilation and Depressurisation System (VDS)

**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

**Sub-Atlantic Observation ROVs**
- Innovative design
- Straightforward, intuitive diagnostics
- Broad range of tools, skid and customer specific accessories

**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

**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
Global Support

- Regional Headquarters
- Manufacturing

Locations:
- Rio de Janeiro
- Aberdeen
- Houston
Whether this is by phone, e-mail, an online support portal or simply regular technical bulletins, Forum 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

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

Forum aims to be the key piece in the jigsaw for all its clients. By taking an integrated approach to delivering our full range of products and services, we are a partner of choice when it comes to subsea technologies. Our focus on our client’s needs means our products enhance their performance, while our open communication ensures we act on feedback to make improvements and engage to deliver solutions to their problems.

We would like to thank the following clients for the use of their images and images of their equipment throughout this publication. DOF Subsea, Subsea 7, MMT Sweden AB, Canyon Offshore Ltd, Swire Seabed, Wachs Subsea, NOAA Okeanos Explorer Program, TDI-Brooks International, Inc.
Forum Subsea Technologies’ wide range of products and services, focusing on remote technologies, have an extensive track record...

- **262** ROV Launch & Recovery Systems (LARS)
- **490** ROV Winches
- **565** WROVs supplied
- **383** TMS supplied
- **248** OBSROV’s supplied
- **47** Trenchers supplied
- **1020+** PLRs supplied
- **22000+** Hot Stabs supplied
- **25** Tautwire systems supplied
- **750** Digital Video Systems supplied
- **1100** Visualsoft licenses supported round the globe
- **360+** Suction Pile Vent Hatches
- **500** Supported Digital Video Systems operational
- **100+** Simulators supplied
- **1000+** WROV buoyancy modules
- **1300+** ROV Intervention tools supplied
- **25000+** ROV Components supplied
Perry Work-Class ROVs continue to evolve as new technology and development are made available. By focusing 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.

Forum 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.

With facilities and experienced personnel in the UK, US, Brazil and Asia, Forum 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. Forum’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 Forum 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
- 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

Facilities

Forum 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.

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

Specification

<table>
<thead>
<tr>
<th>Perry XLX Evo Ultra Heavy Duty ROV system</th>
<th>Perry XLX-C Heavy Duty ROV system</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Category</strong></td>
<td>Hydraulic work-class</td>
</tr>
<tr>
<td><strong>HP Rating</strong></td>
<td>200hp</td>
</tr>
<tr>
<td><strong>Depth Rating</strong></td>
<td>3000m (4000m option)</td>
</tr>
<tr>
<td><strong>Dimensions (H/L/W(mm))</strong></td>
<td>2282 / 3605 / 1905</td>
</tr>
<tr>
<td><strong>Payload</strong></td>
<td>300kg</td>
</tr>
<tr>
<td><strong>Through Frame Lift</strong></td>
<td>3000kg</td>
</tr>
<tr>
<td><strong>Bolland Pull</strong></td>
<td>1050kgf</td>
</tr>
<tr>
<td><strong>Features</strong></td>
<td>• Intelligent control system</td>
</tr>
<tr>
<td></td>
<td>• Intuitive automatic control modes</td>
</tr>
</tbody>
</table>

| **Category**                             | Hydraulic work-class              |
| **HP Rating**                            | 150hp                             |
| **Depth Rating**                         | 3000m                             |
| **Dimensions (H/L/W(mm))**               | 1900 / 2800 / 1700               |
| **Payload**                              | 200kg                            |
| **Through Frame Lift**                   | 3000kg                           |
| **Bolland Pull**                         | 850kgf                           |
| **Features**                             | • Intelligent control system      |
|                                          | • Intuitive 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.

Specified for

<table>
<thead>
<tr>
<th>Category</th>
<th>Mojave</th>
<th>Mohawk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Depth Rating</td>
<td>Portable / Inspection</td>
<td>Inspection</td>
</tr>
<tr>
<td>Maximum Payload</td>
<td>12kg</td>
<td>35kg</td>
</tr>
<tr>
<td>Dimensions (H/L/W(mm))</td>
<td>500 / 1000 / 600</td>
<td>630 / 980 / 770</td>
</tr>
<tr>
<td>Mass in Air</td>
<td>85kg</td>
<td>165kg</td>
</tr>
<tr>
<td>Electrical Requirements</td>
<td>5.6 kVA 80-260 Vac 1-Phase 50/60Hz</td>
<td>8 kVA 440 Vac 3-Phase+Neutral 50/60 Hz</td>
</tr>
</tbody>
</table>
COMING SOON

XLe Spirit, Spirit-Aqua & eROV range

Forum Energy Technologies has initiated a program to build a new range of electric ROV’s. The aim was to develop a new range of electric ROV’s which were complementary to each other, technologically advanced and meet the challenges of a fast changing market.

Designed and manufactured in-house at Forum’s Kirkbymoorside Yorkshire facility, the “XLe Spirit” is the company’s first of a new generation of electric ROV’s.

The “Spirit” vehicle is the smallest in the new range but is powerful enough to perform subsea maintenance and repair work with the use of its optional electric or hydraulic five function manipulator arm. The vehicle’s self regulating power feature compensates for tether losses ensuring a constant and stable power delivery to the vehicle regardless of tether length.

It uses the same advanced Forum Integrated Control Engine (ICE™) found in larger work-class and trencher vehicles in the Forum product range. This provides a wide range of auto-pilot and pilot assist modes when appropriate sensors are fitted.

The advanced control electronics pod fitted to all Forum XLe electric vehicles enables superior connectivity and expansion capabilities when compared with other ROV’s on the market. Ethernet interfacing allows for seamless integration with other industry sensors using common IP architecture and ease of remote data transfer.

Forum will also introduce the “XLe Spirit Aqua”. A bespoke variation of the “Spirit” vehicle tailored to the specialist tasks of the Aquaculture industry.

<table>
<thead>
<tr>
<th>Mohican</th>
<th>Super Mohawk</th>
<th>Comanche</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inspection</td>
<td>Inspection/Light Work</td>
<td>Work/Survey</td>
</tr>
<tr>
<td>2000 - 3000m</td>
<td>2000 - 3000m</td>
<td>2000 - 3000 - 6000m</td>
</tr>
<tr>
<td>35kg</td>
<td>35kg</td>
<td>285kg</td>
</tr>
<tr>
<td>790 / 1100 / 800</td>
<td>850 / 1400 / 900</td>
<td>1250 / 2100 / 1300</td>
</tr>
<tr>
<td>340kg</td>
<td>395kg</td>
<td>1130kg</td>
</tr>
<tr>
<td>15 kVA 440 Vac 3-Phase+Neutral 50/60 Hz</td>
<td>15 kVA 440 Vac 3-Phase+Neutral 50/60 Hz</td>
<td>35 kVA 440 Vac 3-Phase+Neutral 50/60 Hz</td>
</tr>
</tbody>
</table>
Trenchers

Forum is the world’s leader in best-in-class trenching and cable maintenance technology.

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**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

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**Specification**

<table>
<thead>
<tr>
<th>Category</th>
<th>XT300</th>
</tr>
</thead>
<tbody>
<tr>
<td>Depth Rating</td>
<td>3000m</td>
</tr>
<tr>
<td>Dimensions (H/L/W (mm))</td>
<td>3100 / 4200 / 3730</td>
</tr>
<tr>
<td>Rated Power</td>
<td>220kW / 300HP</td>
</tr>
<tr>
<td>Bollard Forward Pull</td>
<td>1100kg</td>
</tr>
<tr>
<td>Bollard Lateral Pull</td>
<td>1100kg</td>
</tr>
<tr>
<td>Bollard Pull Up</td>
<td>900kg</td>
</tr>
<tr>
<td>Control System</td>
<td>Perry ICE System</td>
</tr>
</tbody>
</table>
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 flow-line 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 Forum’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.
Tether Management Systems

Forum 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

<table>
<thead>
<tr>
<th>Garage TMS 1</th>
<th>Garage TMS 2</th>
<th>Garage TMS 3</th>
<th>Top-Hat Type IV</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Category</strong></td>
<td>Observation ROV</td>
<td>Observation ROV</td>
<td>Observation ROV</td>
</tr>
<tr>
<td><strong>Depth Rating</strong></td>
<td>3000m</td>
<td>3000m</td>
<td>3000m</td>
</tr>
<tr>
<td><strong>Dimensions</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Height (mm)</strong></td>
<td>Max: 2031 / Min: 1,631</td>
<td>Max: 2403 / Min: 1923</td>
<td>Max: 3034 / Min: 2554</td>
</tr>
<tr>
<td><strong>Length / Width (mm)</strong></td>
<td>1590 / 1074</td>
<td>1966 / 1288</td>
<td>2830 / 1664</td>
</tr>
<tr>
<td><strong>Safe Working Load</strong></td>
<td>2000kg</td>
<td>2000kg</td>
<td>3500kg</td>
</tr>
<tr>
<td><strong>Through Frame Load</strong></td>
<td>500kg</td>
<td>570kg</td>
<td>2000kg</td>
</tr>
<tr>
<td><strong>Tether Capacity dia.-length</strong></td>
<td>16.5mm - 385m</td>
<td>25mm - 200m</td>
<td>21mm - 750m</td>
</tr>
<tr>
<td><strong>To Suit ROV</strong></td>
<td>Mohican / Mohawk</td>
<td>Mohican / Super Mohawk</td>
<td>Comanche</td>
</tr>
</tbody>
</table>
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. Forum 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 Forum 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 focused on tether path geometry, tether load sensing and proportional speed controls resulting in increased reliability and higher capacity. The Forum range of tether management systems simply work!
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.

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

Forum’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 Forum is the ‘go-to’ in the industry. Forum’s range of OEM components includes Compensators, Buoyancy, 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

<table>
<thead>
<tr>
<th>Model</th>
<th>Brushless AC</th>
<th>Brushless DC</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>CTE-01 (Single)</td>
<td>CTE-02 (Double)</td>
</tr>
<tr>
<td>Propeller Dia. (mm)</td>
<td>150</td>
<td>150</td>
</tr>
<tr>
<td>Max. Bollard Thrust (kgf)</td>
<td>29 (fwd)</td>
<td>29 (fwd)</td>
</tr>
<tr>
<td>Supply Voltage</td>
<td>440V 3 phase</td>
<td>300Vdc</td>
</tr>
<tr>
<td>Weight (Air/Water) (kg)</td>
<td>8/5</td>
<td>9.3/6.4 1</td>
</tr>
</tbody>
</table>
**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

<table>
<thead>
<tr>
<th>Model</th>
<th>SA-PH30030</th>
<th>SA-PH38040</th>
<th>SA-PH42060</th>
<th>SA-PH500110</th>
</tr>
</thead>
<tbody>
<tr>
<td>Propeller Dia. (mm)</td>
<td>300</td>
<td>380</td>
<td>420</td>
<td>500</td>
</tr>
<tr>
<td>Max. Bollard Thrust (kgf)</td>
<td>370</td>
<td>460</td>
<td>590</td>
<td>850</td>
</tr>
<tr>
<td>Max. Continuous Flow (lpm)</td>
<td>56</td>
<td>70</td>
<td>98</td>
<td>154</td>
</tr>
<tr>
<td>Weight (Air/Water) (kg)</td>
<td>17.4/9.8</td>
<td>27/14</td>
<td>34/17</td>
<td>59/31</td>
</tr>
</tbody>
</table>

**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

**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

**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

**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 Forum 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 Forum under the LEXT programme range from intensive equipment servicing, through obsolescence management and control system upgrade, to vehicle replacement. Forum 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 Forum LEXT programme, unforeseen and unbudgeted costs – often experienced with clients’ own in-house alternatives – can be minimised. Forum’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

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

Forum’s subsea tools are carefully designed to be operator friendly and fit for purpose. Forum’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.

Forum 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 Forum are able to offer a comprehensive support service to our customers around the globe.

Forum can supply highly skilled and qualified offshore tooling technicians to support operations. Forum’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.

Subsea Tooling

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

Torque Tool

Forum produces every interface in ISO 13628-8 and API 17H. From the largest Class 7 at 25000ft lbs to Class 1 at 50ft lbs Forum 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

Forum 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 Lifeline 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. Forum supplies both ISO/API interface standards and client specials. Forum 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

Forum 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, Forum 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

Forum 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.
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 Forum offer the services of our skilled VisualSoft installation engineers to assist with mobilisation on vessels and at office locations.

Forum’s VisualSoft system was the first digital video system introduced into the offshore oil and gas industry. Since then Forum 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.

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

Forum’s customer service for VisualSoft includes round the clock support and a range of training courses to suit client needs. Forum 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.
1. Acquisition (Online)

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

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

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

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

Visual Edit 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

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

Visual Edit
- 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

Forum’s VMAX™ 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 Forum’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 Forum’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)

*Forum has a VMAX training simulator suite available for hire*

VMAX Desktop ROV Simulator

- Pelican case for storage and mobility
- Operates on a laptop or PC
- USB connection
- Configurable environmental conditions via instructor screen
- 7 function master controller interface

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

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**Scenario services**

- Development of subsea scenarios
- Environmental variable applied
- Provided as scenario for customer simulator
- Access studies
- Promotional animation service
- Provided as complete ‘as flown video’
- Tailored scenario required
- VMAX developed
- Client developed
- VMAX “flies” the operation
- Client “flies” the operation
- VMAX player replay
- Video replay
Launch & Recovery Systems

Forum 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 Forum’s Dynacon products the premier solution for offshore winches and handling systems.

Backed by experienced and dependable engineers and technicians, Forum’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

Forum’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, Forum 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 electro-active levelwind
- Drip pans
- Water-over-oil heat exchanger
- Integrated protection guards
- DNV GL certification

These standard features make Forum’s Dynacon systems work-ready 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

Forum’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
- Umbilical cooling system
- Drum temperature monitoring
Buoyancy

Forum’s Syntech products provide high-quality and cost-effective syntactic buoyancy solutions to clients around the globe.

The original company was founded in 1985 to serve the marine and oceanographic industries worldwide. Forum’s core Syntech products are syntactic foam buoyancy modules for ROVs. In addition Forum can supply a range of syntactic materials for numerous other subsea and marine applications.

Syntactic buoyancy material properties can also be tailored to meet the varying demands of a variety of underwater applications. In particular the acoustic characteristics of the materials, such as transparency, absorption, reflection, and refraction, are ideally suited for underwater applications, such as acoustic windows, anechoic test tank linings and transducer isolators and decouplers.

Custom-made tooling can be used to manufacture specific syntactic foam geometries in batch quantities or, alternatively, for smaller custom applications blocks or sheets can be bonded, finish machined and ultimately coated in a protective skin.

Syntech Buoyancy Foam Modules are used on the Forum Perry XLX, FMC Schilling HD/UHD Gen 2, Oceaneering Millennium/Magnum and Saipem Innovator ROVs.

In addition Syntech Buoyancy Foam Modules are used on the Forum Perry XT1200 and XT1500 Trencher.
### Products

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### ROV Buoyancy Foam Modules

The quality and reliability of Forum’s Syntech products is evidenced by the fact that Syntech is demanded by many Original Equipment Manufacturers (OEMs) and end users of equipment such as work-class ROVs and observation class ROVs, AUVs, trenchers, deep water moorings, torpedo target arrays, sonar arrays, and scientific instrumentation.

### Umbilical/Cable Float

Syntech Umbilical/Cable Floats are of a proven robust and durable design. They are used in a variety of ROV and survey operations worldwide. The operating depth of Syntech Umbilical/Cable Floats range from 500 metres to 6000 metres.

### Cylindrical Marker Floats (CMF)

Forum’s Syntech CMF comprises a PVC exterior shell with a variety of syntactic foams at the core. The cylindrical shape with flat ends allows them to be more easily staged, shipped and transported than any other marker floats. Additionally, the Syntech CMF is of modular design and can be created in varying sizes, along with variable inside diameters. Syntech CMF can be provided coated or uncoated to meet specific client needs.

### Syntactic Acoustic Damping Material (SADM)

By combining syntactic foam technology with advanced acoustics theory a novel class of underwater sound attenuators has been created. These materials, known as the SADM and the Syntactic Acoustic Transducer Baffle (SATB) families of syntactic foams, have repeatedly shown high levels of echo reduction and insertion loss over the 10 KHz - 100 KHz range, both at ambient pressure and at operating depth. Two types of materials are available: -1 series for broadband attenuation and -0.5 series for improved performance at higher frequencies (above 30 KHz). These materials have been found to be extremely effective in a number of underwater acoustic applications. SADM has been used extensively as an anechoic acoustic test tank lining. SATB is designed for use as a transducer isolation mounting material. Acoustic characterisation graphs are available which detail the transmissive and reflective properties of flat test panels.

### Custom Moulded Syntactic Solutions

Custom Distributed Buoyancy Modules

Forum can provide custom built Syntech Distributed Buoyancy Modules (DBMs) that can be designed and manufactured specifically for the end-user. The DBMs are placed into specific geometric configurations that allow a reduction in tension loads, offering a calculated amount of uplift to the pipeline.

Custom Solutions

Forum has developed bespoke Syntech buoyancy blocks for fitment to a range of subsea cutters. The buoyancy blocks were designed to withstand the harsh environment experienced during cutting operations and the shape is optimised so as not to intrude on the operations.

### Umbilical/Cable Float

Syntech Umbilical/Cable Floats are of a proven robust and durable design. They are used in a variety of ROV and survey operations worldwide. The operating depth of Syntech Umbilical/Cable Floats range from 500 metres to 6000 metres.
Subsea Engineering

Forum’s 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. Forum’s Moffat products have a class leading reputation with strong global client list to match.

Facilities

Forum’s manufacturing facility for Moffat products is located in Northumberland, North East England. 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. Forum has a large library of pre-qualified weld procedures, qualified in accordance with all major oil companies’ specifications. In addition Forum 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

Forum 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.
Moffat 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 on the application required.

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

Moffat Surplussing Check Valve

The Moffat Surplussing Valve™ is a special check valve that allows flow in the forward direction only once a pre-determined cracking pressure has been reached. The surplussing valve is bubble tight in the reverse flow direction. It has many uses but is typically employed to prevent hose collapse due to external sea-water pressure for deepwater operations. This allows a hose to be deployed with an internal pressure applied to balance the external hydrostatic pressure. During operation the pressure is raised beyond the cracking pressure and the valve will open and allow flow. If the pressure drops below the cracking pressure the valve closes to protect the hose.

Moffat Hot Stabs

The Moffat Subsea Stab Connector™ has been in service since 1995 and is now recognised by many operators as the industry standard.

The Moffat Hot Stab is designed to the following codes:


Sizes range from: 3/4” to 8” Nominal Bore.

Materials: 316L, Duplex, Super Duplex, Inconel 625 and others upon request.

The wide range of Moffat Hot Stab connectors include the patent pending Dual Position Hot Stab, a highly advantageous field solution, whereby the Hot Stab can open and close, eliminating the need for a Blind Stab or valve solution.

Pig Launchers / Pig Receivers (PLRs)

The Moffat subsea PLRs have been supplied extensively to both offshore/subsea operators and ROV intervention contractors.

- Hundreds of units supplied to sites worldwide
- Pressure range up to 10000 PSI (690 BAR)
- Line pipe sizes up to 42”
- Complete with Skid/Bump Protection Frames
- Topside and Subsea designs
- Deepwater applications in excess of 2000m
- Complete with ROV operable subsea ball valves
Defence Products

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

Forum has a wealth of experience in the design, manufacture, testing / commissioning and operation of submersible vehicles. Since 1974, the company has produced over 450 manned and unmanned systems including rescue submersibles and ROVs with special purpose tooling. Technology has advanced remarkably since the production of the first ‘LR’ class submersible and today’s Submarine Rescue Vehicles (SRVs) are built to free fly under battery power and are capable of diving in depths of 600 metres to rescue up to 18 submariners per dive. The latest NATO Submarine Rescue System (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 all other surface elements of NSRS. The rescue system has a normal operating depth which exceeds the survival depth of many full size submarines.
Custom Products

Custom solutions can be provided from across the whole of the Forum 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 Forum 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 Forum 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 Forum 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.
## Product Enquiry Contact Details

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<tr>
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<td>(UK) +44 (0) 1751 431 751</td>
<td><a href="mailto:rov.sales@f-e-t.com">rov.sales@f-e-t.com</a></td>
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<tr>
<td>Sub-Atlantic Observation ROVs</td>
<td>(UK) +44 (0) 1751 431 751</td>
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<td>Syntech Buoyancy</td>
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<td>Dynacon Launch and Recovery Systems</td>
<td>(US) +1 (0) 979 823 2690</td>
<td><a href="mailto:dynacon.sales@f-e-t.com">dynacon.sales@f-e-t.com</a></td>
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<tr>
<td>VMAX Subsea Simulation</td>
<td>(US) +1 (0) 713 329 8714</td>
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<td>Sub-Atlantic ROV Components</td>
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<tr>
<td>Singapore</td>
<td>+65 (0) 646 54 850</td>
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