exail

SOLUTIONS FOR SUBSEA POSITIONING AND NAVIGATION

WHY CHOOSE EXAIL SUBSEA POSITIONING AND NAVIGATION SOLUTIONS?

Proven track record

Hundreds of subsea vehicles worldwide rely on Exail subsea navigation and acoustic positioning technologies. Renowned globally for offering the most high-end systems available on the market, Exail solutions are acknowledged for their exceptional reliability, impressive performance, and versatility across a diverse range of operations.

High accuracy and precision

Exail subsea navigation and positioning solutions deliver unparalleled levels of accuracy and precision, which represents a crucial element in every aspect of subsea navigation. Whether it's offshore drilling, marine construction, oceanographic surveys, or any other critical underwater operation, Exail solutions ensure that every movement is precise and calculated. In the field, this translates into streamlined and optimized operations, resulting in optimal outcomes.

Interoperable solutions for easy field integration

Exail subsea navigation and positioning solutions are designed with ease of integration in mind. Their compact and plug-and-play design facilitates the effortless incorporation into a wide array of underwater vehicles, including the smallest ones. Compatibility with other subsea systems and the ability to seamlessly integrate into existing workflows results in significant time and resource savings during implementation, fostering exceptional flexibility and efficiency in the field.

Unmatched reliability in harsh environments

Engineered to withstand the rigors of subsea environments, Exail navigation and positioning solutions are robust and reliable. Built upon solid-state Fiber-Optic Gyroscope (FOG) technology, which implies no moving parts, Exail Inertial Navigation Systems (INS) and Attitude and Heading Reference Systems (AHRS) ensure a high level of reliability without the need for periodic maintenance. They provide robust navigation capabilities in the harshest environments, enduring high pressures, variable temperatures, and diverse water depths.

Scalability and versatility through comprehensive solution portfolio

Exail offers scalable solutions tailored to meet specific operational requirements for various platforms. With the industry's broadest range of INS, unparalleled USBL performance, and a suite of LBL and sparse LBL systems, that can be used either individually or in combination, Exail technologies cover the full range of operations below the sea surface. From work class ROVs and AUVs to tow fishes, metrology, construction, or survey tasks involving single or multiple vehicles, Exail's comprehensive solutions streamline operations, reduce errors, and enhance overall accuracy.

Global support and service network

Exail maintains a responsive global support and service network, offering clients timely assistance whenever needed. This extensive support infrastructure enhances the reliability of their solutions, providing peace of mind to clients worldwide.

COMPREHENSIVE SOLUTIONS FOR SUBSEA POSITIONING AND NAVIGATION

Subsea inertial navigation systems

Exail subsea INS offer unmatched navigation accuracy for ROVs and AUVs operating in the most demanding environments. Compact, lightweight, and pre-calibrated, they are crucial assets for subsea operators, enhancing operational efficiency in the field:

- Heading accuracy: ≥ 0,01 deg seclat
- Roll & pitch accuracy: ≥ 0,01 deg RMS
- DVL-aided optimal performance: ≥ 0,01%TD – CEP50
- Depth rating: down to 6,000 m

LBL and sparse-LBL positioning systems

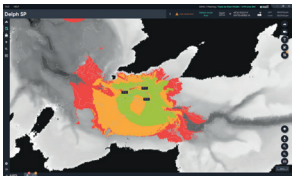
Exail's Canopus transponders and Ramses transceivers, through their seamless integration with Exail INS/AHRS, enable highly accurate and reliable deep-sea operations:

- Positioning accuracy: 10 mm
- Acoustic communication: 9 kbps
- Autonomy (pings at max sound level): 2,800 000 (alkaline)
- Data telemetry: from 500 bps to 3 kbps
- Data logging: 32 (Gb)

USBL positioning systems

Gaps Series USBL positioning systems provide subsea assets with absolute location and acoustic communication across all applications, from ultra-shallow to deep water depths:

- Acoustic coverage: 200°
- Operating range: up to 7,000 m (in extended range)
- Positioning accuracy: ≥ 0,06% slant range
- Range accuracy: 20 mm



Complete supervision software for subsea operations

Exail Delph Subsea Positioning software is a highly intuitive tool that simplifies the planning, simulation, operation, and post-processing of complex subsea positioning operations, thereby enhancing operational accuracy and efficiency:

- Analyzing acoustic propagation with Digital Terrain Model and Sound Velocity Profile
- Real-time visibility maps for LBL acoustic transponders and transceivers
- Running advanced algorithms for LBL array calibration
- Generating automatic calibration reports

ROBUST UNDERWATER NAVIGATION

Equiping **80%** of ROVs worldwide

Unrivaled navigation performance

As the most advanced navigation systems available today, Exail subsea INS and AHRS deliver the highest navigation performance to all types of subsea vehicles:

- From standard navigation to survey-grade precision
- Precise navigation: up to 0.01% of travel distance
- Enhanced performance through INS/DVL tight-coupling
- Further precision achieved via data post-processing with Exail Delph INS Subsea software

Seamless integration and deployment

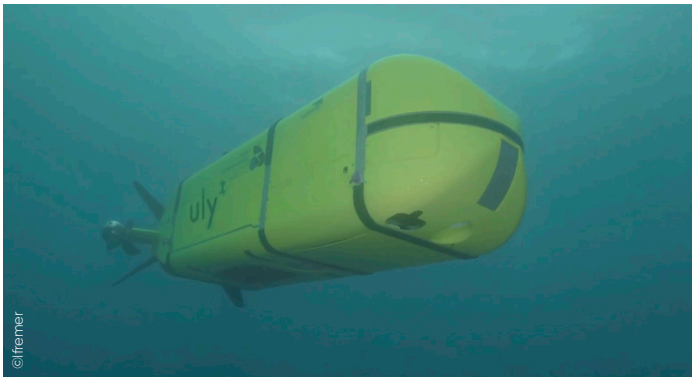
Exail systems are tailored to address subsea operators' challenges, enhancing efficiency through:

- Optimized SWaP-C for easy integration
- Third-party and external sensors compatibility for seamless integration within existing infrastructures
- Quick deployment with in-motion alignment and pre-calibration
- Long-duration deployments through low power consumption (< 12 W)

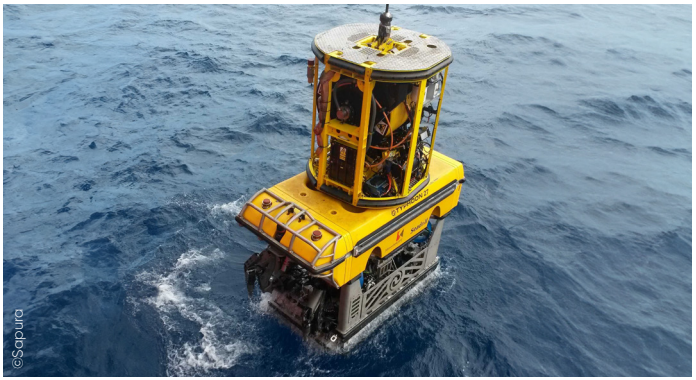
Unmatched reliability in harsh environments

Built upon field-proven and solid-state Fiber-Optic Gyroscope (FOG) technology, Exail systems are designed to withstand the harshest environments:

- Suitable for operations down to 6,000 m
- Robust titanium housing
- Highly resistant to extreme temperatures, pressure and vibrations
- Reliable and maintenance-free



Exail INS enhance the navigation performance of the most advanced AUVs for deep-water exploration



Exail INS compact design allows for easy integration into all subsea platforms, from observation-class to work-class UUVs

HIGHLY ACCURATE USBL POSITIONING AND TRACKING

true horizontal tracking

Enhanced positioning performance, from shallow to deep waters

Combining high-performance USBL and FOG-based/MEMS motion sensors, the Gaps Series delivers unrivaled subsea positioning accuracy, from shallow to deep waters:

- Unmatched positioning accuracy: ≥ 0.06% (CEP50)
- Omnidirectional coverage with 200° acoustic aperture
- True horizontal tracking capabilities
- Covering medium to low-frequency applications
- Position update and status recovery communication capability

An agnostic, easy-to-use system

Compact and easy to operate, Gaps Series enables flexible operations, reducing setup time and enhancing operational efficiency:

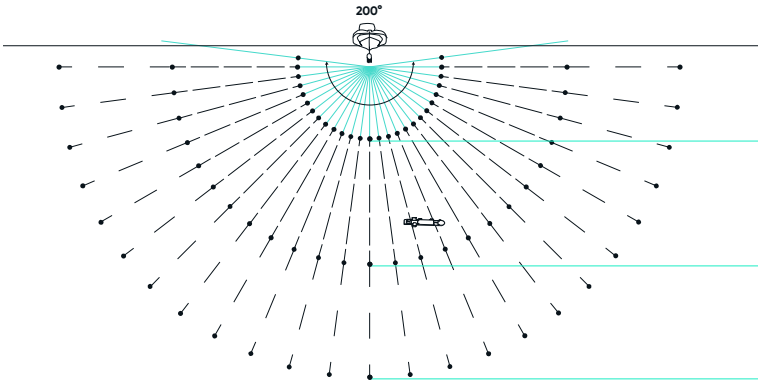
- Easy to deploy: lightweight and compact
- Quick deployments through pre-calibrated systems
- Seamless integration through third-party compatibility
- Easy interfacing with major navigation suites
- Mutiple and simultaneous tracking of subsea assets

A full range of USBL for all operations

The Gaps Series, consisting of three models, offers versatile solutions covering the entire spectrum of operational needs:

- Temporary or permanent installations
- Vessels, USVs, or static installations
- Robust acoustic telemetry and modem capabilities
- Available in extended-range versions for depths down to 7,000 m
- Suited for applications such as diver-tracking, work-class ROV surveys, AUV missions, dynamic positioning

Compact, lightweight, and pre-calibrated, Gaps systems can be quickly deployed from over-the-side poles, stingers and confined spaces



Gaps M3 / M5
Export free
995 m

Gaps M7
Typical MF range
4,000 m

Gaps Series extended range
Typical LF range
7,000 m

ADVANCED LBL AND SPARSE-LBL FIELD SURVEYING

0.01 cm range measurement

Centrimetric positioning accuracy

Exail's LBL solutions ensure precise and reliable deep-sea operations, offering operators centimetric positioning accuracy up to 4,000m. Crucial for operations such as drilling, metrology, subsea construction, geodesy, and seismics, this precision is essential to prevent errors and ensure operational success.

Robust communication capabilities

Canopus transponders and Ramses transceivers offer robust telemetry and modem acoustic communication links among the surface, subsea vehicles, and deployed transponders. With hundreds of acoustic codes for interference-free use in complex environments, they ensure highly reliable subsea operations.

High reliability for long-duration deployments

Designed to withstand the severe subsea conditions encountered in deep waters (ie. 4,000m), the Canopus transponders and Ramses transceivers are ideal for long-duration subsea operations:

- High reliability and corrosion resistance
- Exceptional battery life due to extremely low power consumption

Simplifying planning and operation

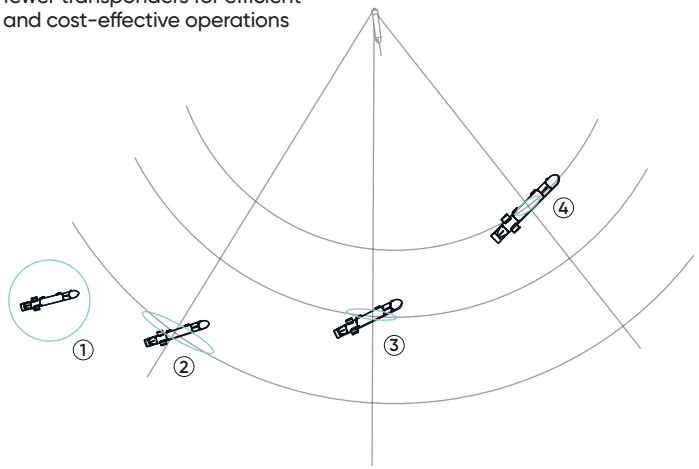
Delph Subsea Positioning software consists of two user-friendly core modules designed to simplify the planning and operation of complex subsea operations. It significantly enhances operational efficiency by streamlining each step, ensuring error-free processes, and saving vessel and manpower time:

- **Planning module:** allows users to autonomously design their LBL array and simulate positioning performance with multiple transponders arrangements
- **Operations module:** provides the required features for the successful execution of a subsea positioning job

Enhanced operational efficiency through sparse-LBL positioning

Exail sparse-LBL solution integrates acoustic and inertial technologies, delivering positioning performance comparable to traditional LBL while reducing the number of deployed transponders. This results in reduced time spent on deployment, calibration, and maintenance, leading to significant cost savings.

Sparse LBL:
fewer transponders for efficient
and cost-effective operations



① The vehicle's INS has a position standard deviation built up from DVL-aided INS navigation.

② The Ramses transceiver is within acoustic range of a Canopus transponder. The range measurement narrows down the possible vehicle's positions.

③ The standard position deviation is further improved as more ranges are received.

④ Tight INS/LBL integration and data fusion further enhances the subsea vehicle's position accuracy and precision using only one single transponder.

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