



exail

NAVAL NAVIGATION

exail at a glance

80

YEARS OF
EXPERIENCE

250+

MILLION EUROS
OF TURNOVER

80%

OF TURNOVER
ACHIEVED ABROAD

1500+

EMPLOYEES

25K+

FIBER-OPTIC
GYROSCOPES SOLD

20%

OF TURNOVER
REINVESTED
EACH YEAR IN R&D

50

NAVIES
EQUIPPED

1000+

NAVAL PLATFORMS
EQUIPPED

24/7

TECHNICAL
SUPPORT

Exail, a global partner in the field of resilient navigation

Today, navies require high performance navigation, with or without GNSS, as well as swifter and more accurate positioning. Exail's pioneering work on the Fiber-Optic Gyroscope (FOG) technology has revolutionized inertial navigation in the last decade, providing state-of-the-art-performance, low cost of ownership and reliability in harsh environments.

The company develops, manufactures and integrates all critical FOG components and is therefore able to adapt, produce, export and maintain its Inertial Navigation Systems (INS). With the full control of the value chain, Exail can design tailored solutions for its customers, stay on the cutting-edge of technology and provide systems that are ITAR-free and only subject to French export regulations.

Benefitting from the FOG technology, Exail provides the most advanced solutions against GNSS jamming/spoofing threats that can compromise critical naval operations. Distributing highly accurate and reliable navigation information to all onboard systems, Exail offers the most resilient information that enables naval forces to conduct uninterrupted operations.

Besides these operational requirements, Exail systems meet industrial integrators' needs for cost-effective and easy-to-integrate equipment. They share strong commonalities with regards to hardware, software and interface, resulting in significant savings in terms of integration, installation, configuration, logistics and maintenance costs.

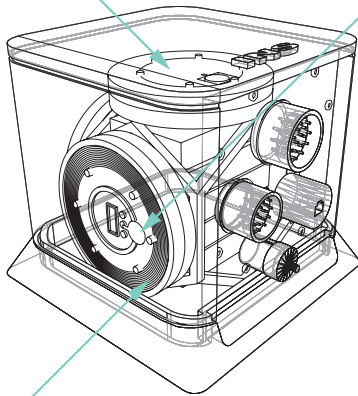
UNRIVALED PERFORMANCE

FOG technology

Leveraging 30 years of advanced expertise in FOG technology, Exail designs and manufactures sea-proven FOG-based Inertial Navigation Systems (INS). This in-house and ITAR-free technology now provides resilient navigation to surface and submarine platforms all over the world. Because Exail has complete mastery over all the components that are integrated into its systems, the company can push the limits of the FOG technology to have it reach new peaks of performance.

Integrated optical circuit

Accelerometers



Optical fiber

Scalable

The performance of a FOG can be changed by altering the length and diameter of its coil, making it adaptable to a wide range of performance needs. Thanks to Exail's mastery of the technology, high levels of performance can be maintained in reduced size products.

Robust and resilient

FOGs are solid-state systems that do not involve any movement of mechanical parts. Operating as a single component and relying only on light motion, they are highly resistant to external disruptions such as shocks, extreme temperatures, magnetism and vibrations, and operate in extreme environments (submarines, long-range artillery, extreme deep-water vehicles, satellites).

FOGs ensure:

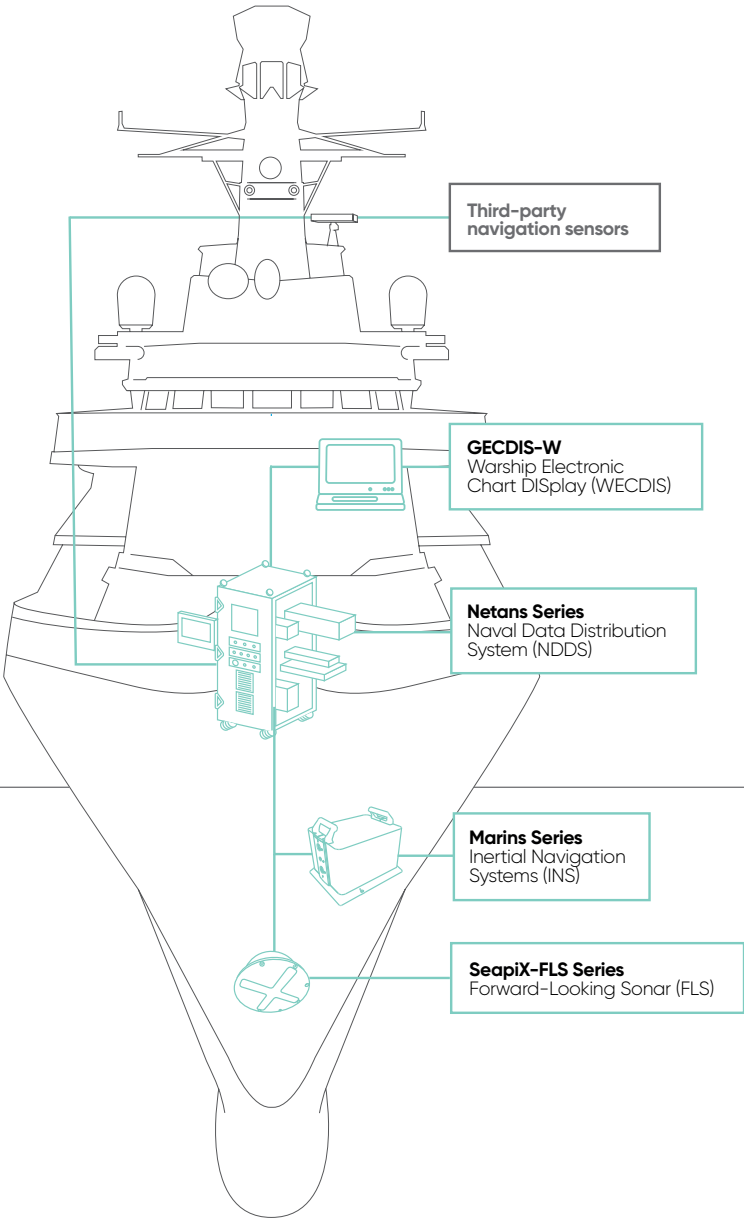
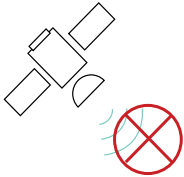
- acoustic stealth
- robustness
- cost-effectiveness
- low cost of ownership
- 500,000 hours MTBF

Sea-proven

Onboard over 50 navies worldwide, Exail's FOG is the only technology offering unrivaled performance while being proven at sea. FOG has furthermore become the standard navigation solution for ROVs and Autonomous Underwater Vehicles (AUV) worldwide and now equips over 80% of those subsea vehicles.

UP TO
1NM
360H

RESILIENT NAVIGATION AT ALL TIMES



Ensuring safe navigation

An INS is at the heart of a vessel's navigation. It provides key position and time data without having to rely on easily disrupted GNSS signals. Such a critical role requires both high-performance, and unfaltering reliability.

Exail is the European leader in naval navigation systems and equips over 50 navies worldwide. Our wide range of sensors and systems are designed to address the requirements of the

full spectrum of naval platforms, from smaller AUVs, USVs and support vessels to aircraft carriers, including main surface combatants and submarines. All of our INS are maintenance and ITAR-free.

In addition, Exail has developed its mine obstacle and avoidance sonar, SeapiX-FLS. This sensor allows for a complete coverage of the water column, and as a result, even safer navigation.

Fully customizable Navigation Data Distribution System (NDDS)

Once all the navigation data has been collected by the sensors, it is acquired, analyzed, correlated and distributed to all onboard systems by Exail's cyber-secured Netans NDDS, that directly interfaces with the ship's combat-system and platform management system.

To protect navigation systems against cyber-attacks, Netans:

- Detects and alerts on sensor data and network stream anomalies
- Implements the latest cyber-security standards

Powerful and easy to use Warship Electronic Chart Display (ECDIS)

In addition to sensors and data distribution systems, Exail provides an in-house ECDIS system, Gecdis-W, covering the full spectrum of a vessel's critical navigation systems.

Gecdis-W is fully compliant with the latest IEC-IMO and IHO standards and regulations. It is the most intuitive interface available on the market.

Thanks to a 100% proprietary chart engine, Gecdis-W provides crews with key benefits:

- A highly configurable man-machine interface where most frequently used functions can be reached in one click
- Smooth data management to import and export data, according to regulations, and a rich database functionality

Among other applications, Gecdis-W can be used for:

- Screen kilo: to ensure safe naval fleet navigation by allowing to visualization of the areas of navigation for each ship in the fleet, with respect to the reference ship.
- Gun sector: to visualize the weapon coverage areas. It provides optimized navigation with respect to the weapon categories onboard.
- Submarine Moving Haven: to avoid collisions with submarines. This feature specifies dynamic or static 3D risk areas.

INERTIAL NAVIGATION



Quadrans

Octans

**Phins Compact
C3 to C7**

Phins

Marins M3/M5

Marins M7 to M11

Type	AHRS	AHRS	INS	INS	INS	INS
Performance						
Heading accuracy (Deg seclat RMS)	0.15	0.1	Up to 0.01	0.01	0.01	0.01
Roll & Pitch accuracy (Deg RMS)	0.1	0.01	0.01	0.01	0.01	0.01
Position accuracy no aiding, without GNSS (TRMS)	N/A	N/A	Up to 0.47 NM/h	0.47 NM/h	Up to 1 NM/24h	Up to 1 NM/360h
Certification						
IMO/IMO HSC	●	●		●	●	●
MIL STD 810/461/167 901 with shock mount					●	●

over 50 navies around the world



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