

POWERED  
BY TRUST

Safran Electronics & Defense  
Etablissement de Malakoff  
55 Boulevard Charles de Gaulle - 92245 Malakoff Cedex - France  
Tél. : +33 (0)1 55 60 38 00 - Fax : +33 (0)1 55 60 01 95  
www.safran-groupe.com



ELECTRONICS & DEFENSE



## NAVAL NAVIGATION SYSTEMS

A game changer for naval superiority



## YOUR REQUIREMENTS INDEPENDANCE & DISCRETION

ALL YOUR MISSIONS  
require precise navigation,  
autonomy & endurance.

PRECISE NAVIGATION  
IN AN ENVIRONMENT  
WITHOUT LANDMARK

ACCURATE **WEAPON &  
SENSORS** STABILIZATION

LONG **ENDURANCE**

ACCURATE & AUTONOMOUS  
**LOCALIZATION** IN GNSS  
DENIED ENVIRONMENT

NAVIGATION  
**SOLUTIONS INTEGRITY**



70 YEARS OF EXPERIENCE  
AS A MARKET LEADER



PERFORMANCE & RELIABILITY  
AT YOUR SERVICE



TAILORED TO YOUR  
REQUIREMENTS



COMBAT PROVEN

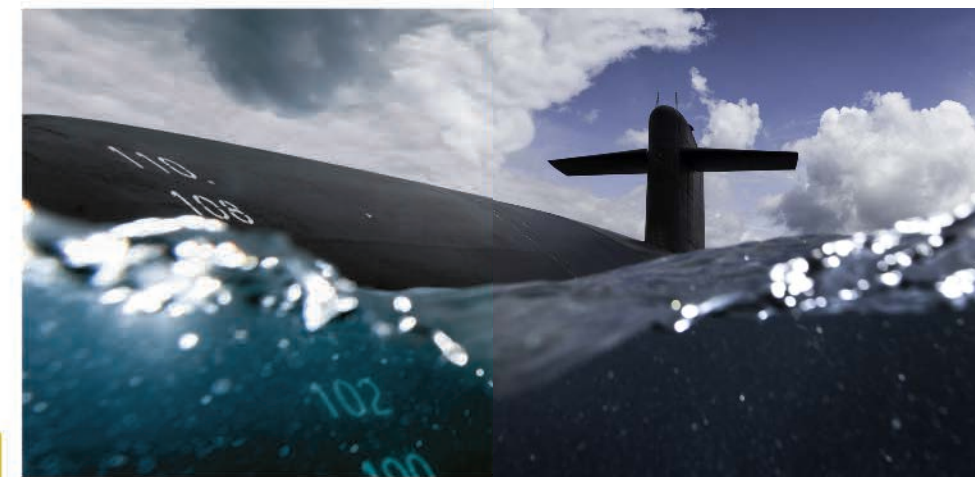


OPTIMIZED LIFE CYCLE COST

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# SAFRAN INERTIAL NAVIGATION SYSTEMS PORTFOLIO: DESIGNED TO MEET THE REQUIREMENTS OF ALL NAVAL PLATFORMS



HRG Crystal™ embedded



IMO Certified + Wheelmark

Product range

Position (TDRMS\*\*)

Heading (° seclat RMS)

Roll & Pitch (° RMS)

MTBF

Heave/Surge/Sway

## MARITIME

### BLUENAUTE®



	BLUENAUTE® COMPASS	BLUENAUTE® PREMIUM	BLUENAUTE® TITANIUM	BLUENAUTE® PLATINIUM
Position (TDRMS**)				1Nm/1h
Heading (° seclat RMS)	0.4	0.2	0.08	0.08
Roll & Pitch (° RMS)	0.01			
MTBF	200,000 h			
Heave/Surge/Sway	5 cm			

## SURFACE VESSELS\*

### ARGONYX™



ARGONYX™ SP	ARGONYX™ HP	ARGONYX™ XP
1Nm/4h 1Nm/16h	1Nm/24h	1Nm/48h 1Nm/72h
0.01		
0.01		
200,000 h		

## SUBMARINES\*

### BLACK-ONYX™



### BLACK-ONYX™ DUAL CORE



BLACK-ONYX™ SP	BLACK-ONYX™ HP	BLACK-ONYX™ XP	BLACK-ONYX™ DUAL CORE SP	BLACK-ONYX™ DUAL CORE HP	BLACK-ONYX™ DUAL CORE XP
1Nm/4h	1Nm/24h	1Nm/48h 1Nm/72h	1Nm/96h 1Nm/120h	1Nm/240h	< 1Nm/360h
			0.01		
			0.01		
			200,000 h		

\* Subject to French export license approval  
\*\*Time Distance Root Mean Square (TDRMS)



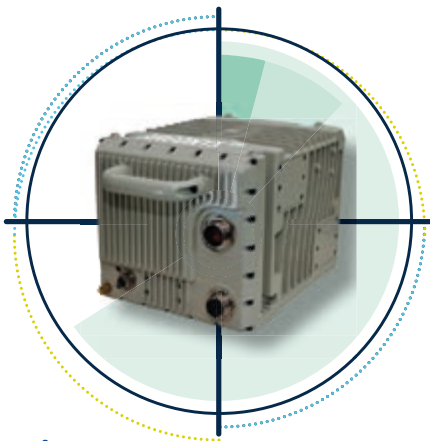
# ARGONYX™ FAMILY

## ACCURACY & COST EFFECTIVENESS FOR SURFACE APPLICATIONS

- **Scalability:** from small patrol boats to aircraft carriers.
- **Operational efficiency:** accurate attitudes & precise localization for sensors stabilization & weapons employment, even in GNSS denied environments.
- **Reliability:** Argonyx™ offers the highest MTBF of the market, and is maintenance free thanks to HRG Crystal™.
- **Easy interchangeability** with Sigma 40.

## ARGONYX™

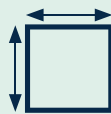


Trustful navigation



MTBF :  
200,000h  
5 year warranty



ITAR free

 <b>Optimized architecture</b>	 <b>Flexible interfaces</b>	 <b>Full naval MIL SPEC certified</b>
The world's lightest naval INS	New user friendly HMI <sup>1</sup>	Shock: MIL STD 810 E & MIL S 901
Weight < 14 kg	Optimized interface with CMS <sup>2</sup>	Vibration (w/o external dampers): IEC 60945 & MIL STD 167-1
Dimensions (mm) 253 x 262 x 414	Ethernet, RS-422, NMEA	Electromagnetic: MIL STD 461F
Consumption < 25 W	Flexible interface library	Temperature: -10 °C to +55 °C (operation) -40 °C to +70 °C (storage)

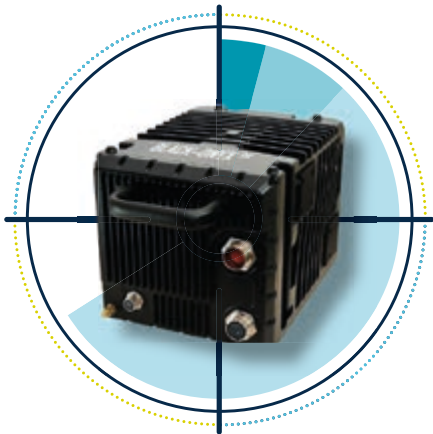
# BLACK-ONYX™ FAMILY

## TECHNOLOGICAL REVOLUTION FOR SUBMARINE APPLICATIONS

- **Submergibility & Autonomy:** Black-Onyx™ offers the highest autonomous navigation performance ever reached in the non strategic submarines market. With Black-Onyx™ Dual Core family those performances are multiplied, reaching navigation accuracies for the most submarines demanding applications.
- **Stealth:** totally silent inertial navigation systems.
- **Reliability:** Black-Onyx™ family offers the highest MTBF of the market and is maintenance free thanks to HRG Crystal™.
- **Easy interchangeability** with Sigma 40.

## BLACK-ONYX™

Unlimited autonomy



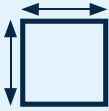


MTBF :  
200,000h  
5 year warranty



ITAR free



Unrivalled  
submergibility  
performance

 <p><b>Optimized architecture</b></p>	 <p><b>Flexible interfaces</b></p>	 <p><b>Full naval MIL SPEC certified</b></p>
<p>The world's lightest submarine INS</p>	<p>New user friendly HMI<sup>1</sup></p>	<p>Shock: MIL STD 810 E &amp; MIL S 901</p>
<p>SWAP: Weight &lt; 18 kg for Black-Onyx (&lt; 25 kg for Dual Core)</p>	<p>Optimized interface with CMS<sup>2</sup></p>	<p>Vibration (w/o external dampers): IEC 60945 &amp; MIL STD 167-1</p>
<p>Dimensions (mm) 253 x 262 x 414</p> <p>Consumption &lt; 25 W</p>	<p>Ethernet, RS-422, NMEA</p>	<p>Electromagnetic: MIL STD 461F</p>
<p>(&lt;50 W for Dual Core)</p> <p>Strapdown, no moving parts</p> <p>Immune to magnetic stress</p> <p>Stealthy</p>	<p>Flexible interface library</p>	<p>Temperature: -10°C to +55°C (operation) -40°C to +70°C (storage T°C)</p>

<sup>1</sup> Human Machine Interface

<sup>2</sup> Combat Management System

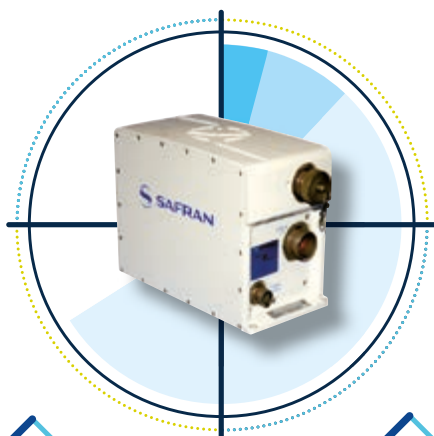
# BLUENAUTE® FAMILY

## COMPETITIVENESS FOR MARITIME OPERATIONS

- Best value maintenance free system.
- Outstanding reliability.
- Latest state of the art HRG technology.
- Immune to severe environmental conditions.

### BLUENAUTE®

Robust & reliable  
gyrocompass, AHRS & INS



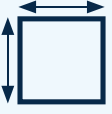


MTBF :  
200.000h



in house



IMO & IMO HSC  
certified

 <b>Optimized architecture</b>	 <b>Robustness</b>	 <b>User friendly</b>
Weight < 4.7 kg	Operational : -20°C to +60°C	COTS
Dimensions (mm) 208x275x136	Waterproofness : IP66	Easy installation
Consumption < 28 W		Maintenance free

# SEANAPSTER, DATA DISTRIBUTION & PROCESSING CENTER FAMILY

## SMART DATA ANALYSIS FOR NAVAL APPLICATIONS

Extracting the right information from a growing volume of data available onboard is increasingly challenging and time-consuming. Always attentive to its customers and partners, Safran has worked hard to offer new robust and capable Data Distribution & Processing Center, able to take up this new challenge. Because many ships require bespoke information distribution solutions, Seanapster is able to suit a large panel of military ships from patrol boats to frigates and submarines, and collects, processes & prioritizes real time data from various sensors. Seanapster then distributes the consolidated information to the relevant systems across your ship.

### FROM SENSORS...

#### A WIDE RANGE OF INPUTS



BlueNaute®



Argonyx™



Black-Onyx™



Autonomous time server



Wind station



Ethernet interfaces



Alarm



Meteorological data



GNSS



Log Echo sounder UPS



Speed

#### SEANAPSTER



### ...TO USERS

#### A WIDE RANGE OF OUTPUTS



Bridge



Optronics



Combat management system



Aircraft alignment

#### A UNIQUE SET OF PROPERTIES

- Sensor data & status acquisition
- Data processing (*hybridization, health monitoring, automatic or manual sensor selection, etc.*)
- Data distribution
- Autonomous time server (*time clock generator, time supervision, time stamp management*)
- User interface (*CDU, navigation system configuration & command, Graphical User Interface*)

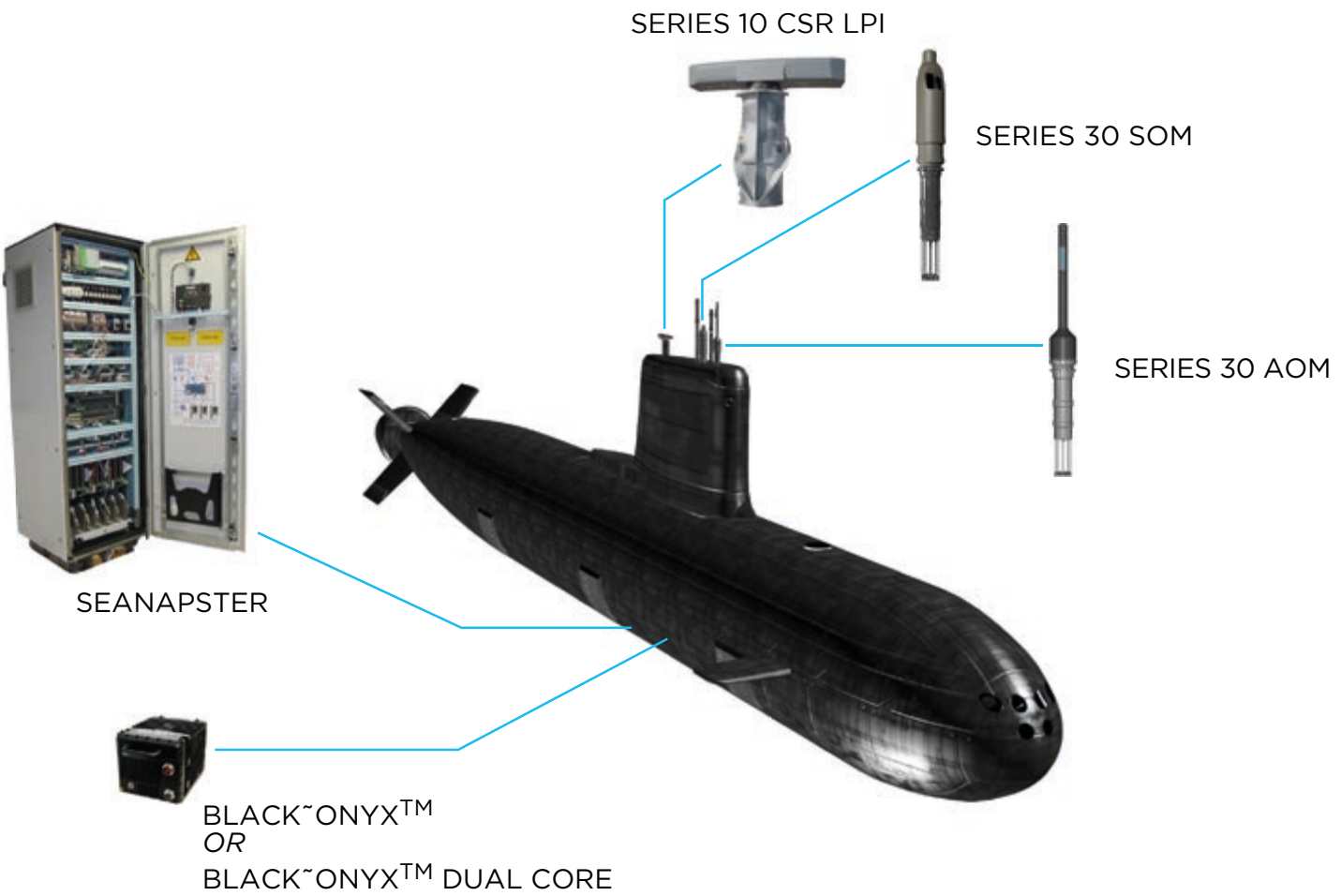
# SAFRAN'S FULL SPECTRUM OF NAVIGATION

## FROM SURFACE VESSELS



# SYSTEMS FOR COMBAT MISSIONS SUCCESS

## TO SUBMARINES

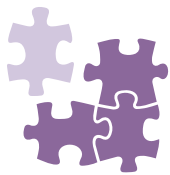




# OUR SUPPORT SOLUTIONS

Thanks to HRG Crystal™ reliability, Argonyx™, Black-Onyx™ and Black-Onyx™ Dual Core families have the best life-cycle costs on the market. This allows Safran to propose innovative support solutions that will boost your vessels and submarines' availability rate.

**Safran offers flexible training programs and cost effective service support to assist you in your operations.**



## INTEGRATION

Worldwide strategic partnerships with companies that can perform product integration on any platform



## LOCAL DEVELOPMENT & MANUFACTURING

- Tailored specifications (HMI\*, etc.)
- In depth manufacturing



## TRAINING

- Operating training
- Maintenance training
- Trouble shooting & corrective training



## TRANSFER OF KNOW-HOW

- Co-operation with local partners
- Transfer of maintenance
- Offset



## WORLDWIDE SUPPORT

- Help desk and hotline
- Local service center
- Field service representative



## INTEGRATED LOGISTIC SUPPORT

- Customer configuration management
- Engineering change management
- Obsolescence management
- On site technical assistance

### SIGMA 40, MAINTAINING THE NAVAL INS REFERENCE

For decades, Sigma 40 has been the world reference in naval applications. Safran will keep manufacturing and supporting Sigma 40 in order to meet costumers' requirements.

Since flexibility is part of Safran's culture, interchangeability between Sigma 40 and Argonyx™ & Black-Onyx™ is ensured to provide customers a wide range of options and prepare the integration of the disruptive new Inertial Navigation Systems families.

## OUR NAVAL REFERENCES

40 navies equipped with Safran's  
inertial systems worldwide

