Military References

GHENOVA

Marine Division

Services and solutions for naval engineering (1/2)

Design

- Feasibility studies
- Conceptual design, all disciplines
- Naval architecture
- Class design
- Finite Element Analysis (FEA)
- Foundations Impact calculations.

Development

- Basic design
- CFD studies
- Detail design
- Production design
- Technical support, construction supervision & commissioning
- 3D laser scanning
- Structural calculations
- Deck outfitting design
- Steel outfitting design
- Accommodation design
- HVAC
- Equipment & services
- Piping
- Electrical engineering
- I&C engineering
- Integrated Logistic Support (ILS)
- Lifting calculations

Marine Division

Services and solutions for naval engineering (2/2)

Consultancy

- New regulatory frameworks
- Combat systems software development
- Conversions & *retrofits*
- Environmental solutions and services
- Operating procedures
- Ballast water management
- Use of alternative fuels
- Energy efficiency
- Training
- Definition of vessel operating models

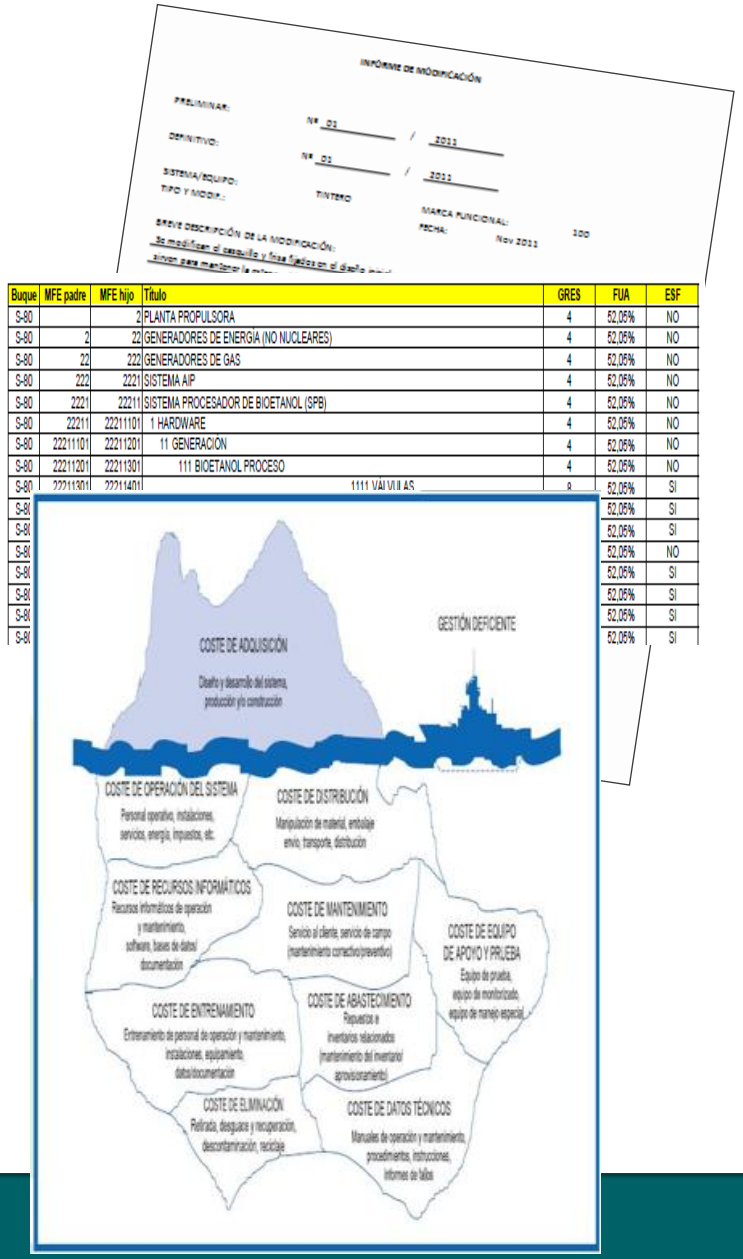
Management

- Interface management plan
- Contract specifications
- Project management
- HSEQ management
- QA management

Marine Division – ILS Capabilities

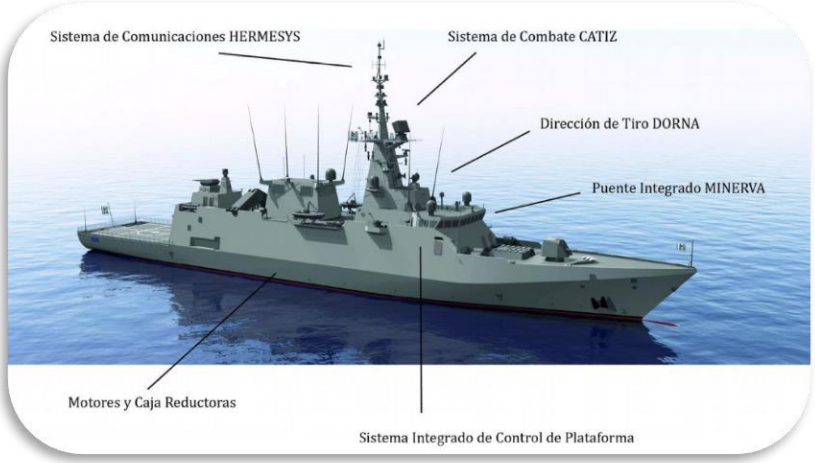
Activities:

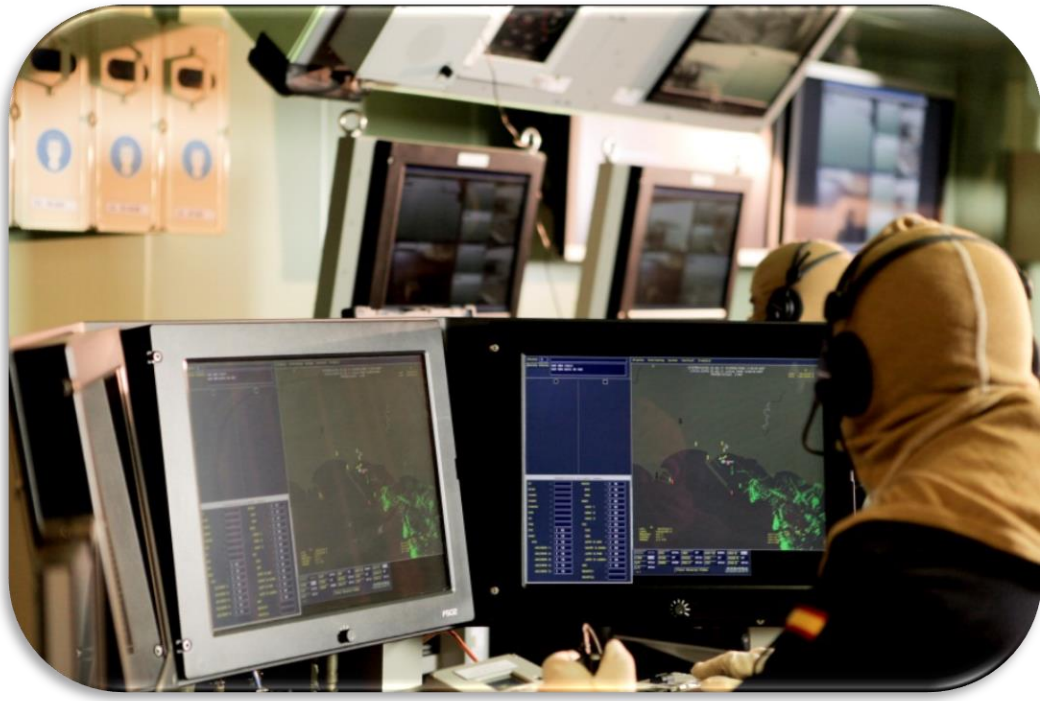
- ILS Management and Planning
- Availability, Reliability and Maintainability
- Reliability Centred Maintenance
- Level of Repair Analysis
- Provisioning / Supply Support
- Obsolescence Management
- Support and Test Equipment
- Training and Training Equipment
- Technical Data and Documentation
- Packaging, Handling, Storage and Transportation
- Through Life Costing
- Disposal
- Logistics Information Solutions.



Combat systems - SCOMBA / CATIZ

- ✓ Specifications, Design and software development. Combat systems modules. NATO / Lockeed Martin (Spanish, Saudi Arabia, Indonesia Navies).
- ✓ Life cycle – complete software development.

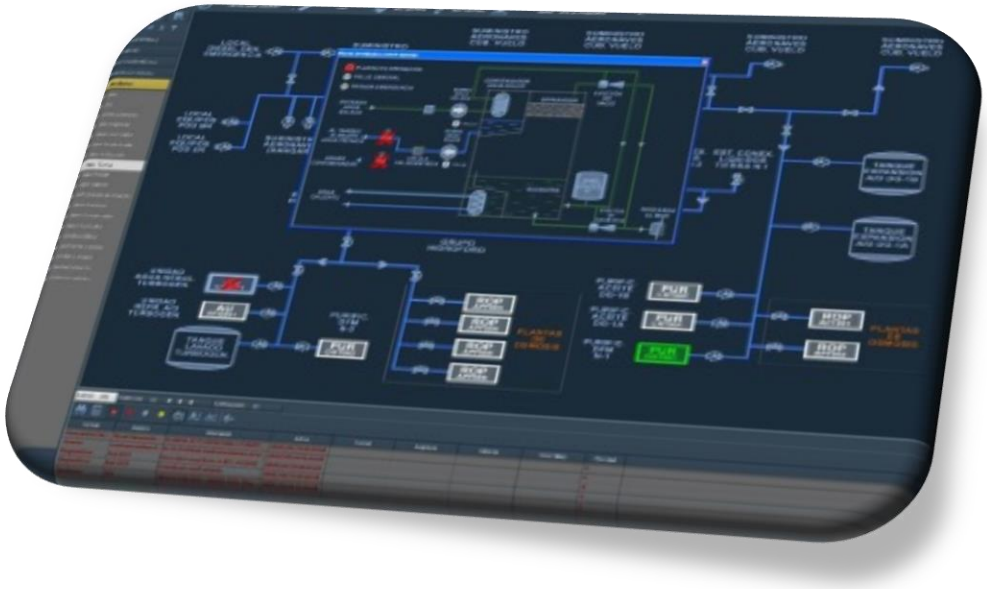




Platform Integrated Control Systems

GHENOVA
soologic®
TECHNOLOGICAL SOLUTIONS

- ✓ Specifications, design and software codification – Integrated Platform Control System. (SCADA, PLC).
- ✓ Design and development HMI (Integrated Bridge Radar simulation).
- ✓ Complete life cycle from specification to sea trials.



GHENOVA

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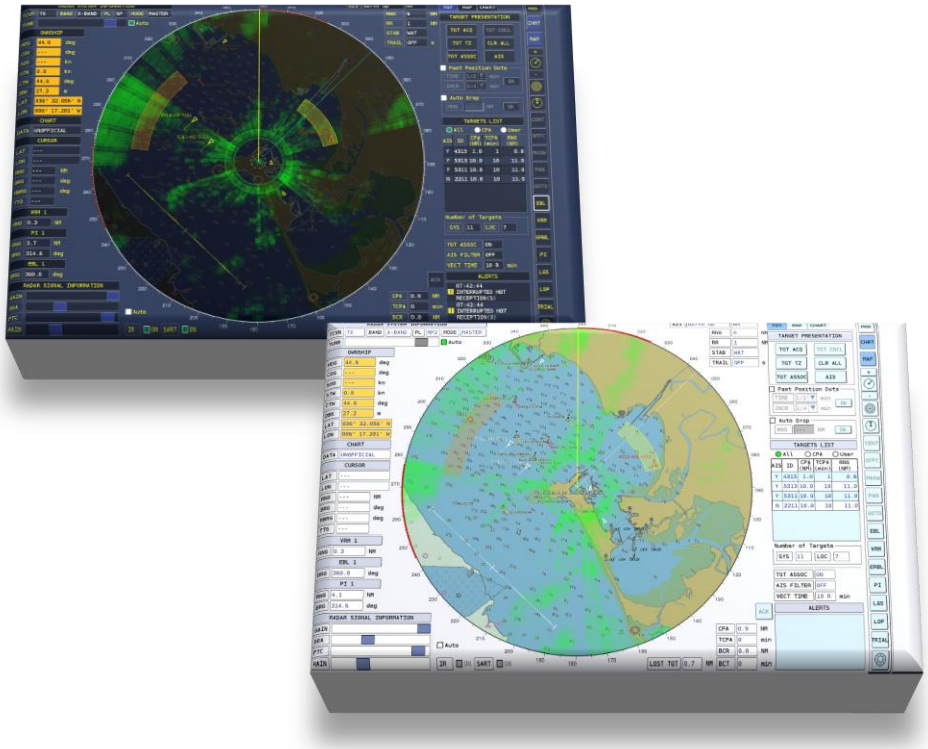
TECHNOLOGICAL SOLUTIONS

HMI Integrated Bridge Radar (Simulation Training)

Specification, design and HMI Development. Under IMO certification.



Key Features

- *GHENOVA has been involved in the development of military naval programs since 2003.*
- *More than 1 million hours of engineering experience accumulated in LHD PROGRAMS.*
- *More than 1 million hours of engineering experience accumulated in FRIGATE PROGRAMS.*

2003

MISTRAL
Astillero: Chantiers de L'Atlantique
Armada: Francia
Eslora: 199,90 metros

2004

HDMS ABSALON
Astillero: ODENSE STEEL SHIPYARD
Armada: Dinamarca
Eslora: 137,60 metros

HNoMS FRIDTJOF NANSEN
Astillero: NAVANTIA
Armada: Noruega
Eslora: 134,00 metros

2008

ANBV GUAICAMACUTO
Astillero: NAVANTIA
Armada: Venezuela
Eslora: 79,90 metros

JUAN CARLOS I
Astillero: NAVANTIA
Armada: España
Eslora: 230,80 metros

2009

F105 (CRISTOBAL COLON)
Astillero: NAVANTIA
Armada: España
Eslora: 146,72 metros

AWD HOBART CLASS
Astillero: ASC Shipbuilding
Socio Tecnológico: NAVANTIA
Armada: Australia
Eslora: 146,72 metros

2015

HMAS CANBERRA
Astillero: NAVANTIA
Armada: Australia
Eslora: 230,82 metros

P362
Astillero: West SEA
Armada: Portugal
Eslora: 83,10 metros

2016

TCG ANADOLU
Astillero: SEDEF
Socio Tecnológico: NAVANTIA
Armada: Turquía
Eslora: 232,00 metros

2018

AVANTE 2200 COMBATANT
Astillero: NAVANTIA
Armada: Royal Saudi Navy
Eslora: 98,90 metros

Basic Design

Complete Electrical Basic Design development

GHENOVA enters into the USA market.

Coordinators in New Orleans. Project developed from Spain.

- **Client:** TAI Inc.
- **End client:** VT Halter Marine
- **Location:** USA
- **Length: NA**
- **Breadth:** NA
- **Design draught: NA**
- **Gross tonnage: NA**
- **Accommodation:** NA

Development: 2019 - 2020

Polar Security Cutter.

US Coastal Guard.

Under ITAR - US Navy rules.

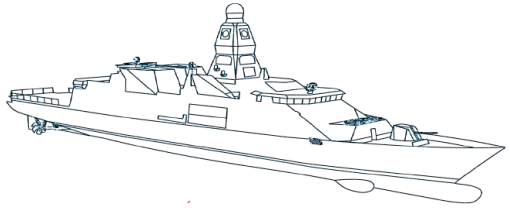
Ghenova approved on SAM, Ncage, NATO and having a Technical Assistance Agreement request to US Coastal by TAI inc.

GHENOVA's main references

PES PROGRAM

Consultancy for Technical Definition of PES program (Surface Strategic Platform)

- **Client:** Colombian Navy
- **End client:** Colombian Navy
- **Location:** Spain-Colombia
- **Development:** 2018



GHENOVA's scope of work:

Preliminary requirements review and new requirements proposal, adding manning, seakeeping and survivability requirements.

Payload (Combat systems and armory) configuration analysis to assure the fulfillment of the requirements, responding to the different combat area demands (ASW, ASuW, AAW & ASMD).

Trade Off analysis, I order to select the best configuration for the combat systems, armory and platform, in order to fulfill the requirements

Preliminary design (feasibility design), from the configuration selected in the previous stage, develop of a design to define the main characteristics of the frigate, including:

GA, stability, seakeeping analysis.
Power balance, Main system diagram.
Auxiliary system: HVAC, Fresh water, Grey & Black water, Compressed air, CBRN.
Vulnerability analysis (AIREX & UNDEX) / Costs and risks

GHENOVA's main references

AVANTE 2200 COMBATANT

"New Corvette program for the ROYAL SAUDI NAVY"

GHENOVA's scope of work

- Complete basic design, complete vessel, all disciplines.
- 3D model
- Complete detail design, complete vessel, all disciplines

- **Client:** NAVANTIA
- **End client:** Royal Saudi Navy
- **Location:** Spain
- **Length:** 98,9 m
- **Breadth:** 13,6 m
- **Design draught:** 4,1 m
- **Accommodation:** 92

Engineering amount: > 170.000 hours
Development: 2017-2019

The Avante 2200 is specially designed for the following missions: EEZ surveillance and protection; Merchant shipping control; Strategic assets defense: Search and rescue operations; assistance to other vessels; immigration control and drugs interdiction; intelligence gathering; anti-surface warfare; passive electronic warfare.

Five vessels will be delivered by NAVANTIA to the Royal Saudi Navy.

GHENOVA's main references

Landing Platform Dock (LPD) TCG ANADOLU

"the first Landing Helicopter Dock (LHD) ship being built for the Turkish NAVY"

GHENOVA's scope of work

- Basic design (partial)
- Complete Detail design, complete vessel, all disciplines.

- **Client:** NAVANTIA
- **End client:** Turkish NAVY
- **Location:** Spain
- **Length:** 232,0 m
- **Breadth:** 32,0 m
- **Design draught:** 6,9 m
- **Troops:** 1.200
- **Vehicles:** 150
- **Aircraft:** 16

Engineering amount: > 650.000 hours

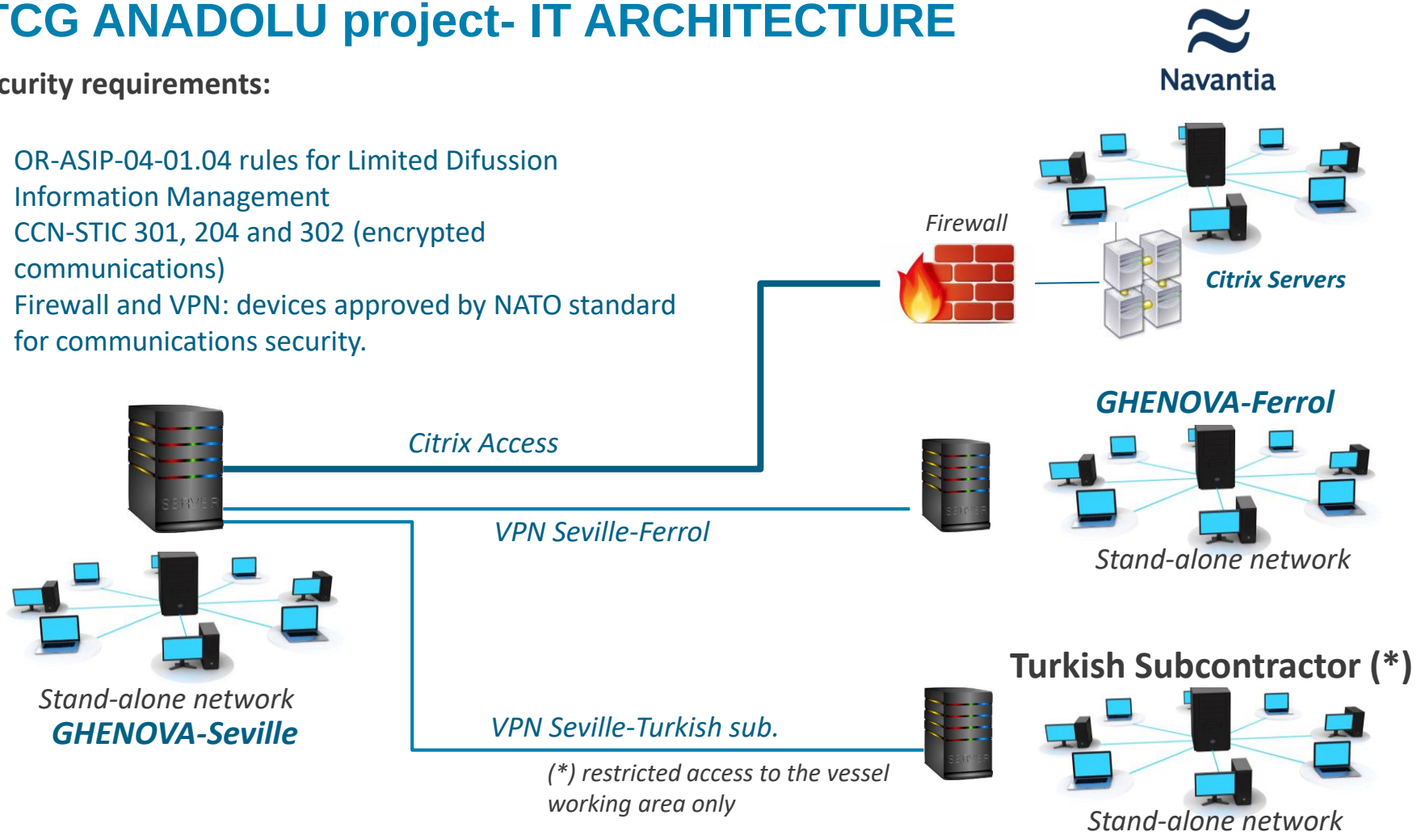
Development: 2016-2020

TCG Anadolu is a planned amphibious assault ship of the Turkish Navy that can be configured as a Light aircraft carrier. It is expected to be completed in 2021. The vessel is intended to meet various needs of the Turkish Armed Forces such as sustaining long endurance, long distance military combat operations and as well as humanitarian relief operations while acting as a command center.

TCG ANADOLU project- IT ARCHITECTURE

Security requirements:

- OR-ASIP-04-01.04 rules for Limited Difussion Information Management
- CCN-STIC 301, 204 and 302 (encrypted communications)
- Firewall and VPN: devices approved by NATO standard for communications security.



SINES (OPV Viana do Castelo Class)

Shipyard: WestSEA
Construction nº: P362
Owner: Portuguese Navy
Type: I.7- Patrol vessel
Year Engineering: 2016-17

Ghenova Scope of Work:

Review basic design modifications from previous OPV built in 2003
Detail design: update hull & outfitting 3D model
Impact design studies on equipment foundations

GENERAL CHARACTERISTICS

Length: 83,10 m
Breadth: 12,95 m
Draught: 3,69 m
Speed: +20 knots
Propulsion: 7.800 kW
Crew: 35+32

GHENOVA's main references

MISTRAL

Shipyard: CHANTIERS DE L'ATLANTIQUE
Construction nº: L9013
Owner: French Navy
Type: I.2-LHD- amphibious assault ship
Year Engineering: 2003

Ghenova Scope of Work:

Complete Fore Detail Engineering (Steel, piping, HVAC, I&C, Combat System, Electricity, Integration).
Support to Production Engineering.

GENERAL CHARACTERISTICS

Length: 199,00 m
Breadth: 32,00 m
Draught: 6,30 m
Speed: 18,8 knots
Propulsion: 23.200 kW
Crew: 770

Source: Chantiers de L'Atlantique

GHENOVA's main references

HDMS ABSALON

Shipyard: ODENSE STEEL SHIPYARD
Construction nº: L16
Owner: Royal Danish Navy
Type: I.5-Frigate- command and support ship
Year Engineering: 2006-8

Ghenova Scope of Work:

Basic engineering: Areas concerning the ship's propulsion equipment, machine chambers, secondary stern locations, stern steerage, casing, and funnel.
Detail Engineering of the entire ship.
Support to production.
Support to the ILS Project.
> 120.000 hours

Source: OSS

GENERAL CHARACTERISTICS

Length: 137,60 m
Breadth: 19,50 m
Draught: 6,30 m
Speed: +28 knots
Propulsion: 16.400 kW
Crew: 160

GHENOVA's main references

HNoMS FRIDTJOF NANSEN

Shipyard: NAVANTIA FERROL
Construction nº: F-310
Owner: Royal Norwegian Navy
Type: I.5-Frigate- Guided Missile and ASW
Year Engineering: 2004
Class. Society: Det Norske Veritas

Ghenova Scope of Work:

Support to the Basic and Detailed Engineering Project
Support to the ILS project
Support to the development of HAT, FAT, SAT procedures

Source: NAVANTIA
Conceptual Design by Navantia

GENERAL CHARACTERISTICS

Length: 134,00 m
Breadth: 16,80 m
Draught: 7,60 m
Speed: +26 knots
Propulsion: 30.500 kW
Crew: 146

ls.

GHENOVA's main references

CANTABRIA

Shipyard: NAVANTIA
Construction nº: A-15
Owner: Spanish Navy
Type: I.8-Logistic- Combat Replenishment Ship
Year Engineering: 2007-8

Ghenova Scope of Work:

Support to the Fore Detailed Engineering Project, (Steel, piping, HVAC, electronics and combat system, electricity, I&C, Integration)
Complete ILS Project
> 90.000 hours

GENERAL CHARACTERISTICS

Length: 173,90 m
Breadth: 23,00 m
Draught: 8,00 m
Speed: 20 knots
Propulsion: 21.960 kW
Crew: 122

Source: NAVANTIA
Conceptual Design by Navantia

GHENOVA

GHENOVA's main references

ANBV GUAICAMACUTO

Shipyard: NAVANTIA
Construction nº: GC-21
Owner: Venezuela Navy
Type: I.7- Patrol vessel
Year Engineering: 2008

Ghenova Scope of Work:

Support to the Detailed Engineering Project of various zones
(Steel, piping, HVAC, electronics and combat system, electricity, I&C, Integration)
Support to the ILS Project

Source: NAVANTIA
Conceptual Design by Navantia

GENERAL CHARACTERISTICS

Length: 79,90 m
Breadth: 11,50 m
Draught: 7,00 m
Speed: 22knots
Propulsion: 5.920 kW
Crew: 34

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GHENOVA's main references

JUAN CARLOS I

Shipyard: NAVANTIA
Construction nº: L-61
Owner: Spanish Navy
Type: I.2-LHD- amphibious assault ship
Year Engineering: 2008

Ghenova Scope of Work:

Detailed Engineering Project of Zones 1 and 7, (Steel, piping, HVAC, electronics and combat system, electricity, I&C, Integration)
>150.000 hours
Load Out and Load Off assistance, Special Lifts studies and simulations, Support to Production Engineering
> 75.000 hours

GENERAL CHARACTERISTICS

Length: 230,80 m
Breadth: 32,00 m
Draught: 7,18 m
Speed: +20 knots
Propulsion: 56.000 kW
Crew: 243

Source: NAVANTIA
Conceptual Design by Navantia

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GHENOVA's main references

CRISTOBAL COLON

Shipyard: NAVANTIA
Construction nº: F-105
Owner: Spanish Navy
Type: I.5-Frigate-
Year Engineering: 2009-10

Ghenova Scope of Work:

Technical assistance to basic engineering
Complete Detailed Engineering Project (Steel, piping, HVAC, electronics and combat system, electricity, I&C, Integration)
>300.000 hours

GENERAL CHARACTERISTICS

Length: 147,00 m
Breadth: 18,60 m
Draught: 4,75 m
Speed: +28 knots
Propulsion: 50.200 kW
Crew: 216

Source: NAVANTIA
Conceptual Design by Navantia

GHENOVA's main references

AWD HOBART CLASS

Shipyard: NAVANTIA
Construction nº: AWD1
Owner: Royal Australian Navy
Type: I.4-Destroyer- Air Warfare Destroyer
Year Engineering: 2009-11
Class.Society: Lloyd's Register

Ghenova Scope of Work:

Technical assistance for basic engineering
Complete Detailed Engineering Project (Steel, piping, HVAC, electronics and combat system, electricity, I&C, Integration)
On-site support
>350.000 hours

GENERAL CHARACTERISTICS

Length: 147,00 m
Breadth: 18,60 m
Draught: 4,75 m
Speed: +28 knots
Propulsion: 50.200 kW
Crew: 216

Source: NAVANTIA
Conceptual Design by Navantia

GHENOVA's main references

CAMBERRA

Shipyard: NAVANTIA
Construction nº: ALHD1
Owner: Royal Australian Navy
Type: I.2-LHD- amphibious assault ship
Year Engineering: 2009-11
Class.Society: Lloyd's Register

Ghenova Scope of Work:

Detailed Engineering Project of Zones 1 and 7, (Steel, piping, HVAC, electronics and combat system, electricity, I&C, Integration)
ILS tasks
>200.000 hours

Source: NAVANTIA
Conceptual Design by Navantia

GENERAL CHARACTERISTICS

Length: 230,80 m
Breadth: 32,00 m
Draught: 7,18 m
Speed: +20 knots
Propulsion: 56.000 kW
Crew: 243

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