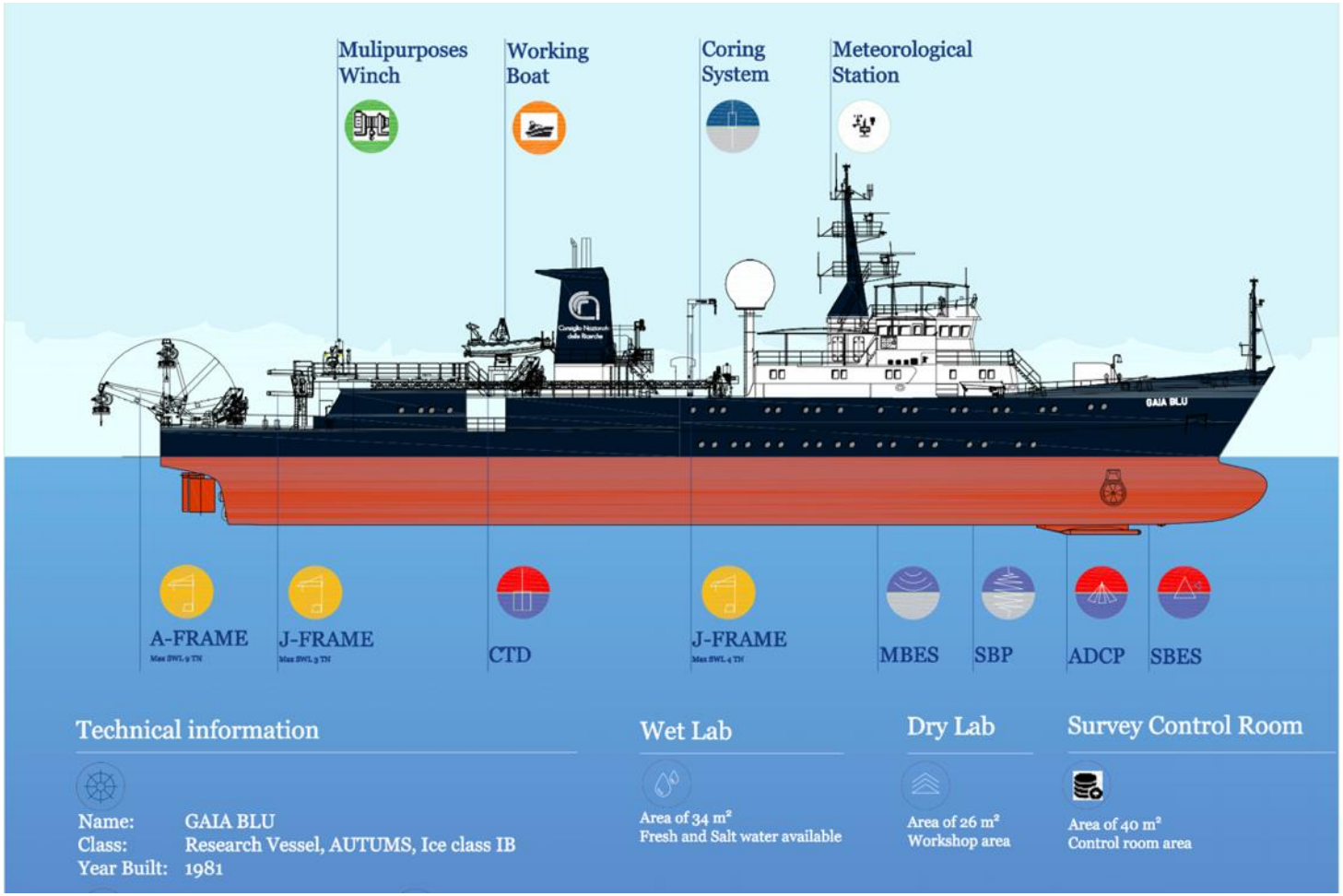
R/V “Gaia Blu”: Management And Technical Challenges In The First Two Years Of Operation.

Lorenza Evangelista & Giuseppe Magnifico (CNR), **Simona Villano** & **Pietro Rosiello** (Argo S.r.l.)

35th IRSO MEETING – Vancouver, 23-27 September 2024

VESSEL PROFILE & TECHNICAL SPECIFICATIONS



Length overall: 82.90 m

Beam, overall: 13.00 m

Draft (design): 4.80 m

Gross tonnage: 2024 T

Engine Power: 2 x 2941 kW

Bow Thruster: 1 x 400 kW, **DP0**

Maximum speed: 17 knots

Cruising Speed: 11 knots

Survey Speed: 8 knots

Max Endurance: 36 days

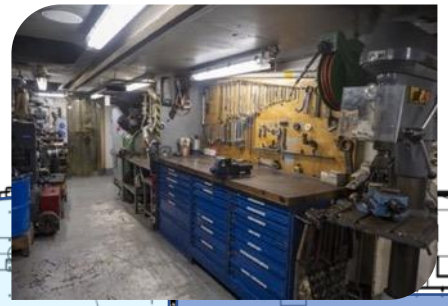
Scientific Personnel: 22 people + 2 technicians

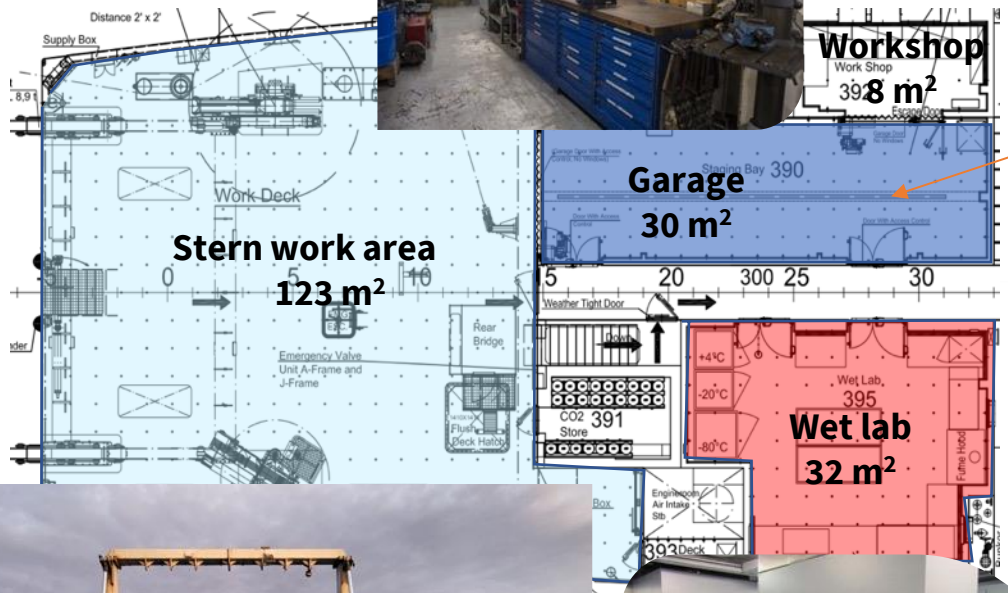
Crew: 18 people

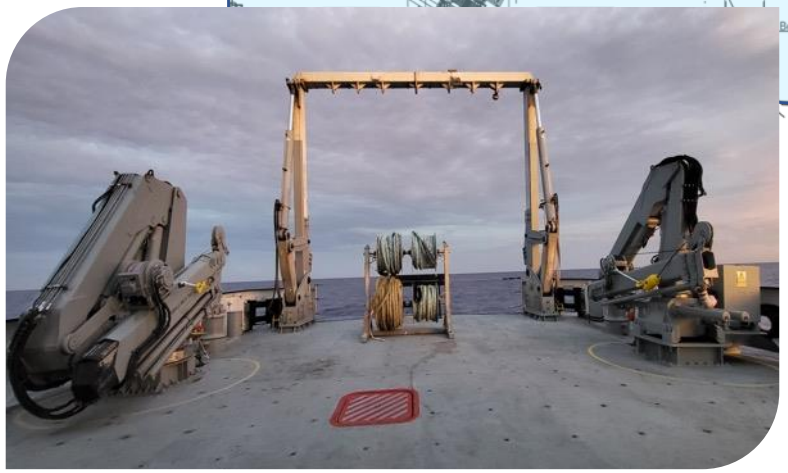
Cabin: 23

Consiglio Nazionale delle Ricerche

OPEN AND ENCLOSED SPACES



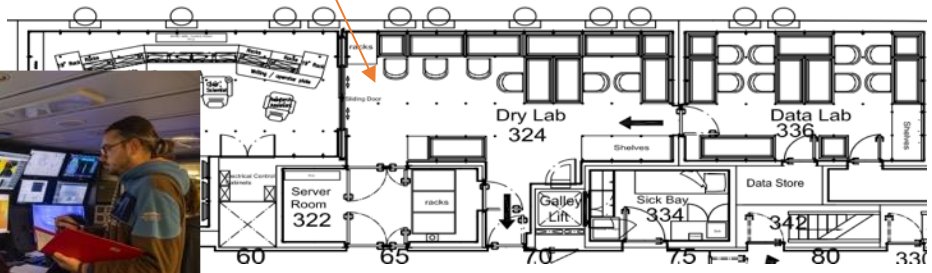




Science Control Room
28 m²

Dry Lab
26 m²

Lab /Office Space
17 m²

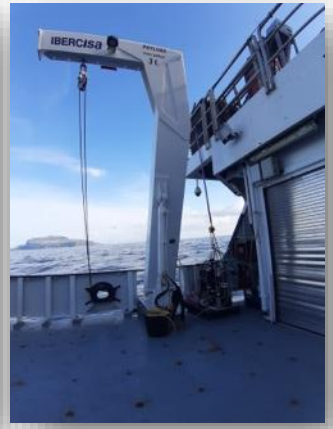


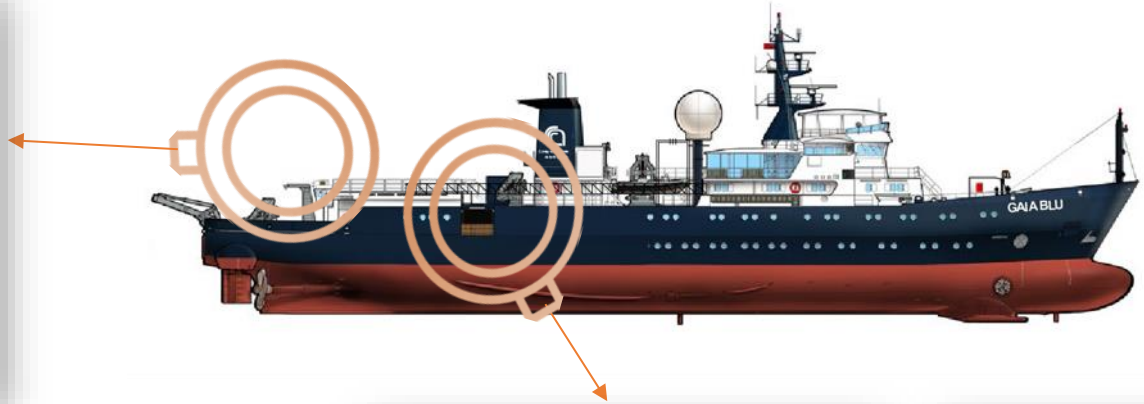
Conference Room/Library

SURVEY EQUIPMENT - GONDOLA

- Kongsberg **EM304 (50 kHz)** Deep Water Multibeam echosounder sostituiti (1000-5000m)
- Kongsberg **EM712 (70-100 kHz)** Intermediate Water (200-1000/1200 m)
- Kongsberg **EM 2040-04 (200-400 kHz)** Shallow Water (< 250 m) - technical design
- Kosberg Seapath 380 + MRU 5 **Differencial Positioning, Heading and Attitude System**
- Valeport: MIDAS SVP (6000 m), MiniSVS, VA500 - **Sound Velocity Sensor and Profiler**
- Kongsberg EK60 - **Fishery Research Echosounder**
- Kongsberg EA600 - **Single Beam echosounder**
- Teledyne Workhorse 300 kHz Acoustic Doppler Current Profiler (**ADCP**)
- Teledyne Pinnacle 45 kHz Acoustic Doppler Current Profiler (**ADCP**) - technical design
- Knudsen **Chirp 3260** 12kHz and array .5KHz 3260 sub bottom profiler - technical design
- Simrad SH90 - **Forward Looking sonar**
- Kongsberg HiPAP 352(P) – Ultra-short baseline system (USBL), **Underwater Positioning**

RESEARCH DEPLOYMENT SYSTEM & SURVEY EQUIPMENT – OCEANOGRAPHY



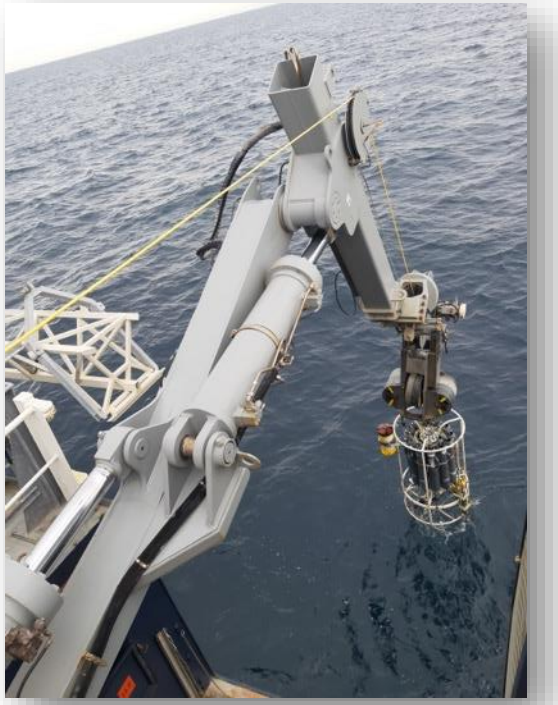


CTD AND WATER SAMPLER

	PAYLOAD	NOMINAL SPEED	POWER	WIRE
IBERCISA ELECTRIC CTD WINCH	4-9 Tons	77.2 m/min	110 kW	kevlar - 6000m Ø10mm
ALLIED MARINE CRANE CTD HANDLING LARS	9 Tons	-	-	-

	WATER DEPTH	NO. WATER SAMPLER
SEABIRD CTD + WATER SAMPLER	up to 6000 m	24 @ 2lt

	PAYLOAD	NOMINAL SPEED	POWER	WIRE
HYDRAULIC MULTIPURPOSES WINCH	3 Tons	25 m/min	110 kW	dynema - 2000m Ø8mm
IBERCISA J-FRAME	3 Tons	-	-	-



RESEARCH DEPLOYMENT SYSTEM & SURVEY EQUIPMENT - GEOLOGY

A-frame

Carmacoring Handling System

CNR CP-20 piston core drill

J-frame

CORING

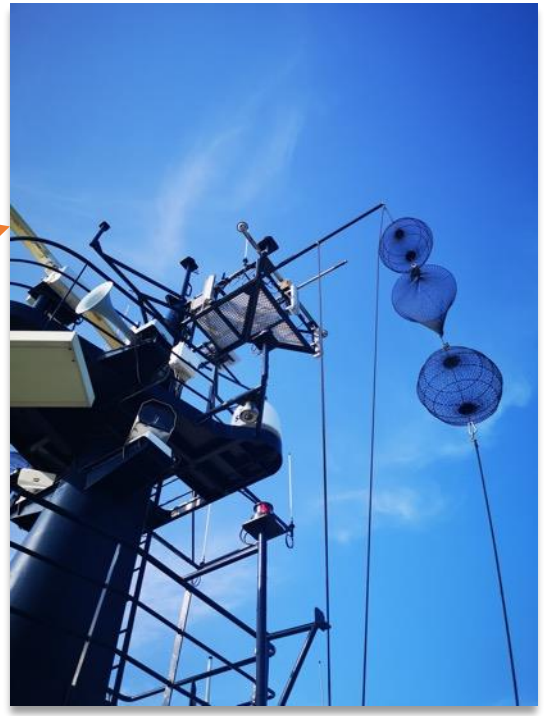
	PAYLOAD	NOMINAL SPEED	POWER	WIRE
IBERCISA ELECTRIC CORING WINCH	4-9 Tons	77.2 m/min	110 kW	6000m Ø12mm
IBERCISA HYDRAULIC J-FRAME CORING	9 Tons	-	-	-
	SAMPLE LENGTH	**SAMPLE DIAMETER**		
CARMA CORING PISTON CORER	up to 25 m	100 mm		

BOX CORING

	PAYLOAD	NOMINAL SPEED	POWER	WIRE
IBERCISA ELECTRIC MULTIPURPOSES WINCH	4.1 Tons	77.2 m/min	110 kW	6000m Ø12mm
McARTENEY HYDRAULIC A-FRAME	8.9 Tons	-	-	-
	SAMPLE LENGTH	**SAMPLE DIAMETER**		
OCEANIC BOX CORER	up to 80 cm	-		

SCIENTIFIC INSTRUMENTS – METHEOROLOGY

- Ecosearch SM45 control unit,
- Apogee, SP-510 Thermopile Pyranometer, SL-510 – Thermopile Pyrgeometer, LI-COR, LI-192 – Campbell Scientific PAR Sensor, CSAT3B – Triaxial Sonic Anemometer; SI-111 – Precision infrared radiometer
- Campbell Scientific, CR1000X – Datalogger, FishSky 360° with Mini PC – All Sky Camera



R/V GAIA BLU is the first in the Mediterranean, and the second in the world (following the "Marion Dufresne" operating in the Indian Ocean), to have installed **on board an automatic photometer for the study of aerosol dynamics, an innovative instrument for aerosol detection in the marine environment.**

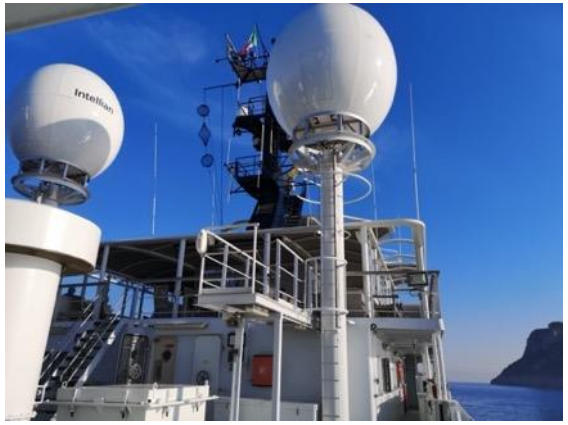
The sensor, named CIMEL 318-T, was developed by researchers at the AGORA laboratory (Laboratoire d'Optique Atmospherique - LOA (**CNRS /Universitè Lille 1**) and CIMEL Electronique company) of the **European Space Agency**.

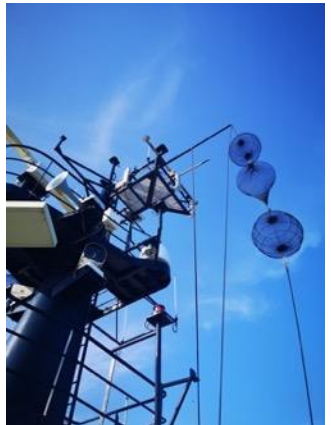
OTHER *FACILITIES*

- Storage Deck for 10 and 20' containers, electricity and water for container lab
- Fully wired ship
- Fast Rescue boat / working boat **Palfinger FRSQ 630**
- Water line for continuous sampling
- **MilliQ water**
- Guildline Autosal Salinometer 8400B
- Stoves, microscopes
- Tritrino Plus Titrator
- **Data center (Storage 112 TERA)**

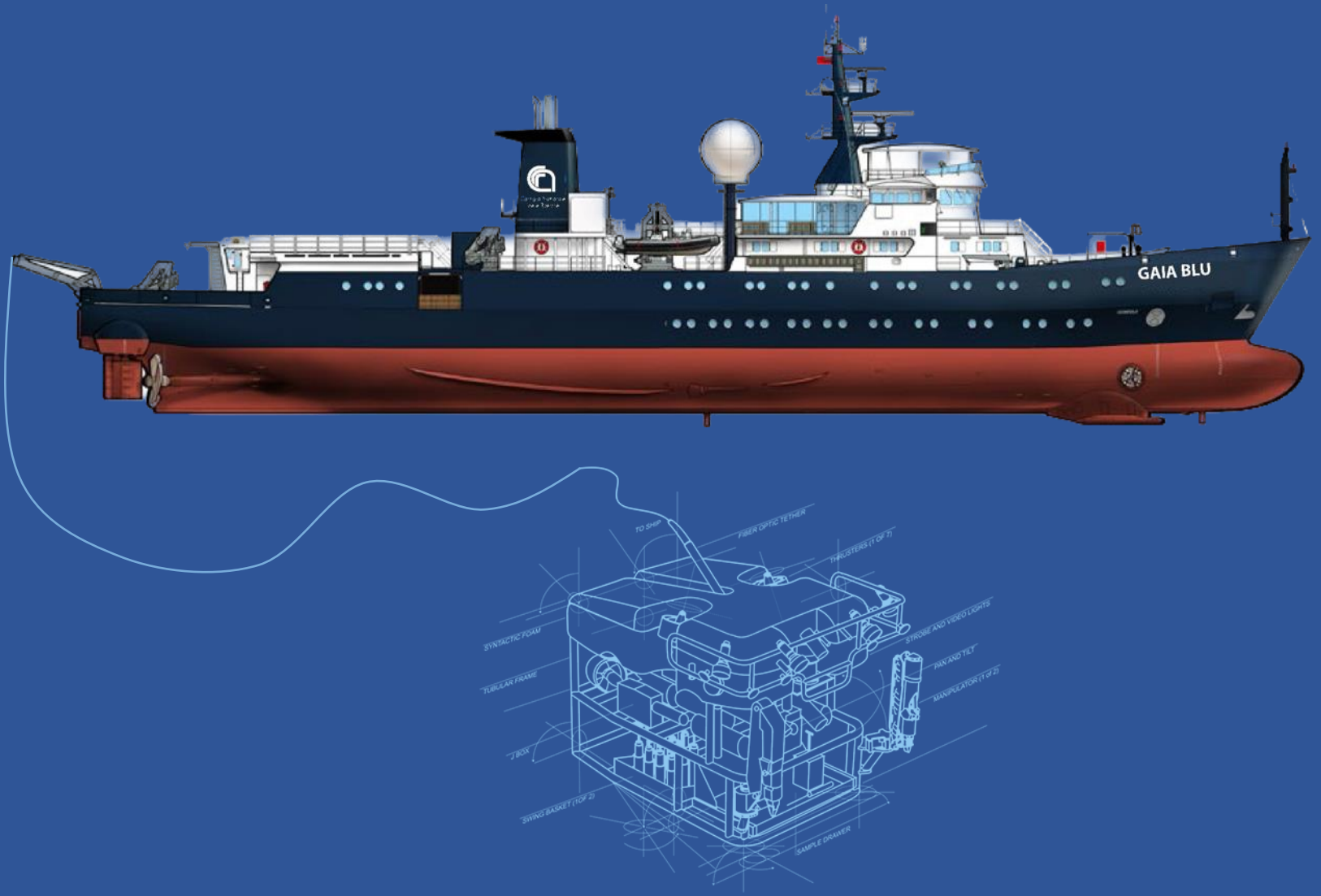
Internet Access – communication and outreach

- VSAT System, dual tracking antennas Intellian modello V240 C
- Seatel 97 series
- C Band
- Land comunication system (LTE), 5G
- **Starlink Flat High Performance Kit (Maritime/Energy)**





Remotely Operated Vehicle (ROV)
(Light-working class)



COMMUNICATION & OUTREACH

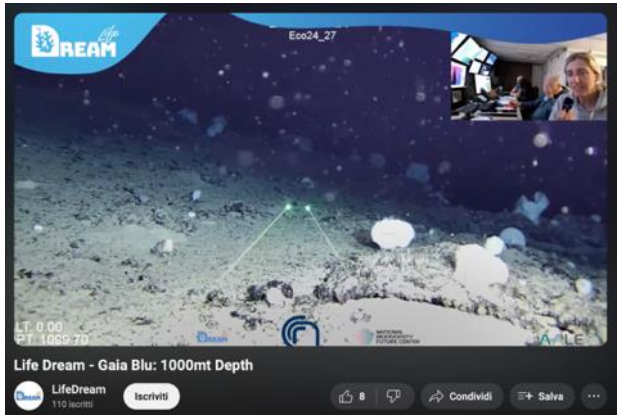
OPEN DAY

Venice, 7-8 May 2023

Genova, 26 Oct. - 5 Nov. 2023

ECOREST CRUISE
Livestreaming ROV

March 2024



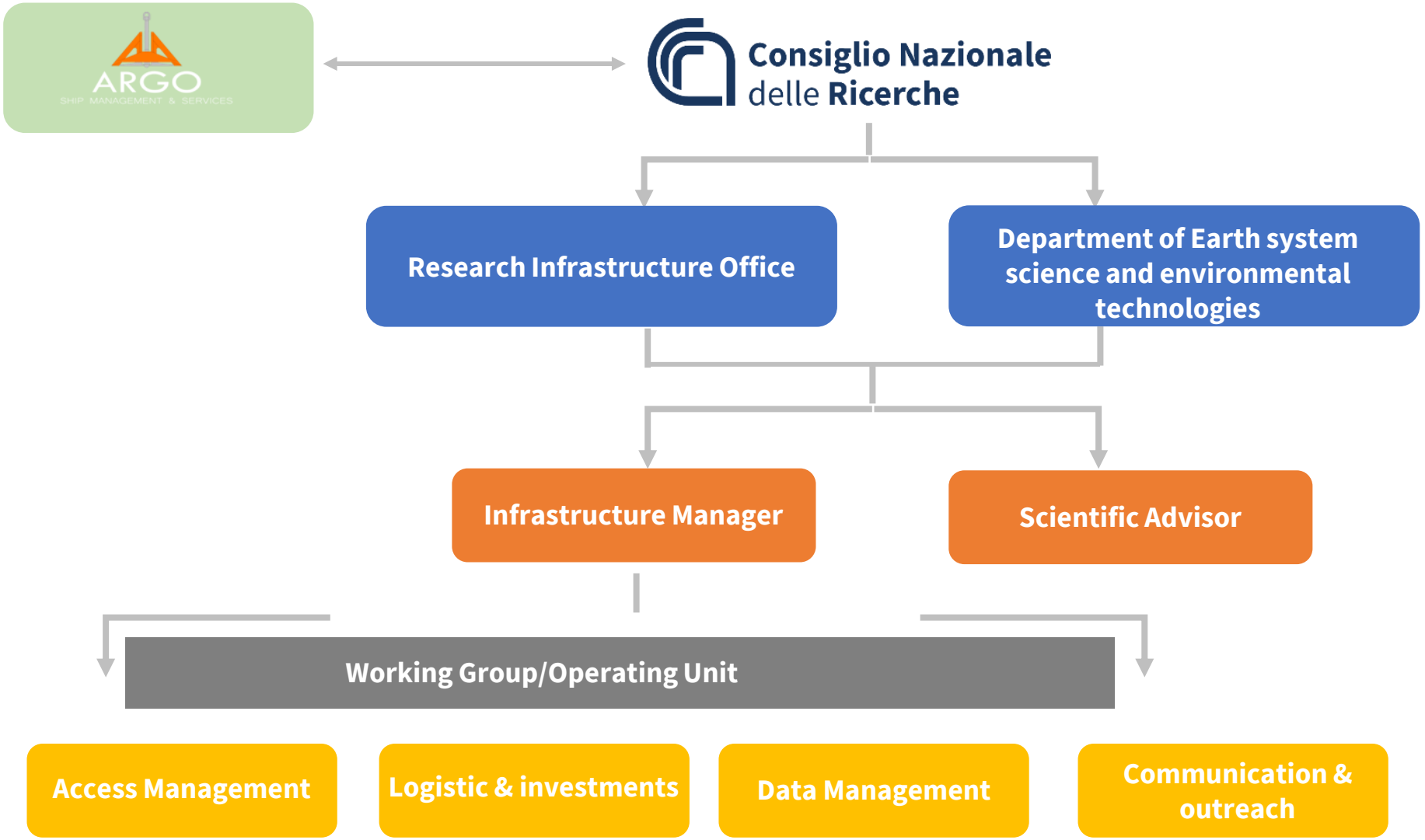
LIVE INTERVIEW

August 2024

LOGBOOK from "Gaia Blu " "Ifigenia" CRUISE

August 2024

MANAGEMENT MODEL: GOVERNANCE



ON-GOING ACTIVITIES:

- ✓ **Launch of a National Access Call**
- ✓ **Acquisition of MFP**
- ✓ Definition of a data policy, aligned with the FAIR data principals
- ✓ Design of a Data managment plan
- ✓ **Design of R/V GAIA BLU website**
- ✓ **Design the logo of R/V GAIA BLU**

ARGO SHIP MANAGEMENT AND SERVICES: **GAIA BLU** SHIP OPERATOR

INNOVATIVE **SHIP MANAGEMENT** FOR **RESEARCH VESSELS**

THE ROLE OF **ARGO** IN MANAGING THE **R/V GAIA BLU**

Consiglio Nazionale delle Ricerche

ARGO
SHIP MANAGEMENT & SERVICES

GLOBAL PRESENCE AND VESSEL TYPES

LEGENDA

- **OFFICE**
- **CREW**
- **CARGO** vessels
- **DP** vessels
- **MINING** vessels
- **SUPPLY** vessels
- **SAMPLING** vessels
- **OFFSHORE** platforms
- **RESEARCH** vessels

VERSATILITY BUILT OVER TIME

PART OF OUR MANAGED VESSELS

ARGO
SHIP MANAGEMENT & SERVICES

FOCUS ON SOME MANAGED RESEARCH VESSELS

Fres

Survey system upgrade

Italica

26 Antarctic campaigns

Laura Bassi

Polar Ship certification

OGS Explora

MERIL database

Gaia Blu

Current **FlagShip**

Acqua Alta

Litus

Tecnopesca II

Aretusa

Astrea

OPERATIONAL EXCELLENCE

CORE VALUES

⚓ SAFETY

SAFETY AWARENESS CAMPAIGN FOR **CREW** AND **RESEARCHERS**

BRIDGING SAFETY DOCUMENTS AND **COORDINATION PLANS**

⚓ ENVIRONMENTAL RESPONSIBILITY

MARINE BIODIVERSITY PROTECTION

''The greatest threat to our planet is the belief that someone else will save it.'' [Robert Swan]

MINIMIZE ENVIRONMENTAL IMPACT

- OPTIMIZED FUEL USAGE
- EFFECTIVE WASTE MANAGEMENT

⚓ INNOVATION & SUSTAINABILITY

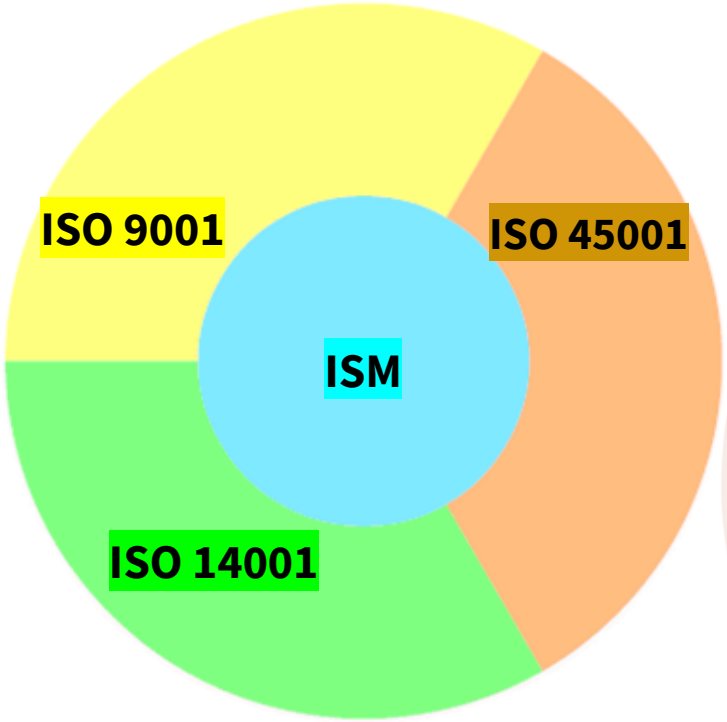
OFFSHORE RENEWABLE ENERGY PROJECTS

LEADING PARTNER IN THE LARGEST FLOATING OFFSHORE WIND FARM IN THE MEDITERRANEAN SEA

LAWS CONFORMITY QHSE MANAGEMENT SYSTEM

COMPLIANCE WITH

ISM-ISO Integrated Management System



INTERNATIONAL SAFETY STANDARDS

- **ISM** Code
- **SOLAS**
- **MARPOL**
- **POLAR** Code
- **ISPS**
- **MLC 2006**
- **STCW**

etc.

ISO STANDARDS

- ISO 9001 : 2015 Quality
- ISO 14001 : 2015 Environment
- ISO 45001 : 2018 Health & Safety

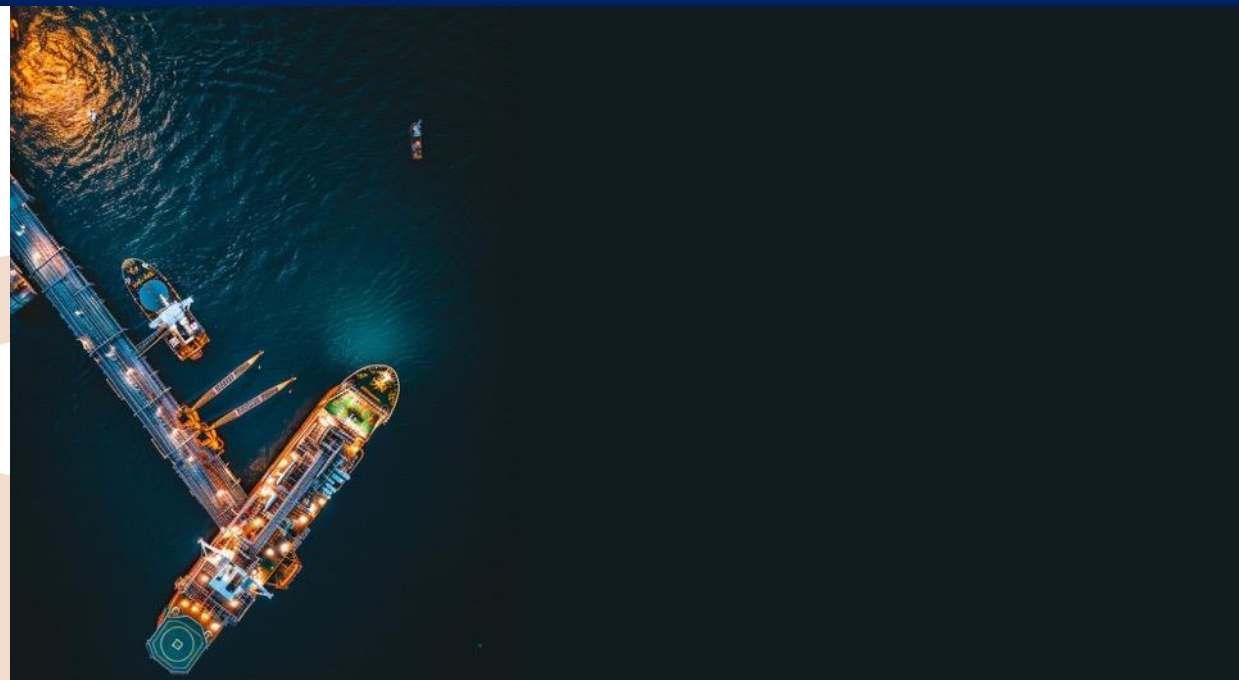
IT INFRASTRUCTURE

ADVANCED

LEADING SOFTWARE
FOR THE DIGITAL SHIP MANAGEMENT
IMPLEMENTED IN THE OFFICE AND ONBOARD THE VESSELS

HIGH LEVEL

IT INFRASTRUCTURE AND
HARDWARE EQUIPMENT
IMPLEMENTED IN THE OFFICE AND ONBOARD THE VESSELS



REAL TIME MONITORING OF SHIP OPERATIONS

OPTIMIZED APPLICATION OF SCHEDULED MAINTENANCE

EFFECTIVE RESPONSE TIME IN CRITICAL SCENARIOS

REINFORCED ARGO ENVIRONMENTAL POLICY

ZERO INCIDENTS GOAL

ARGO
SHIP MANAGEMENT & SERVICES

0 INCIDENTS

IN

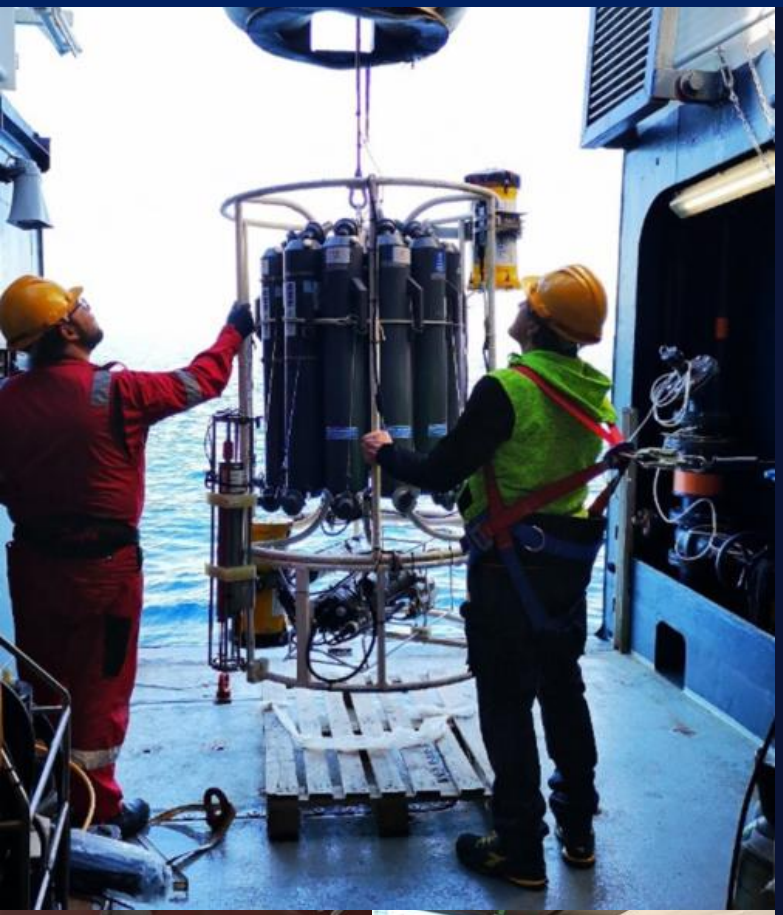
40 YEARS

OF

RESEARCH SHIP MANAGEMENT

2024

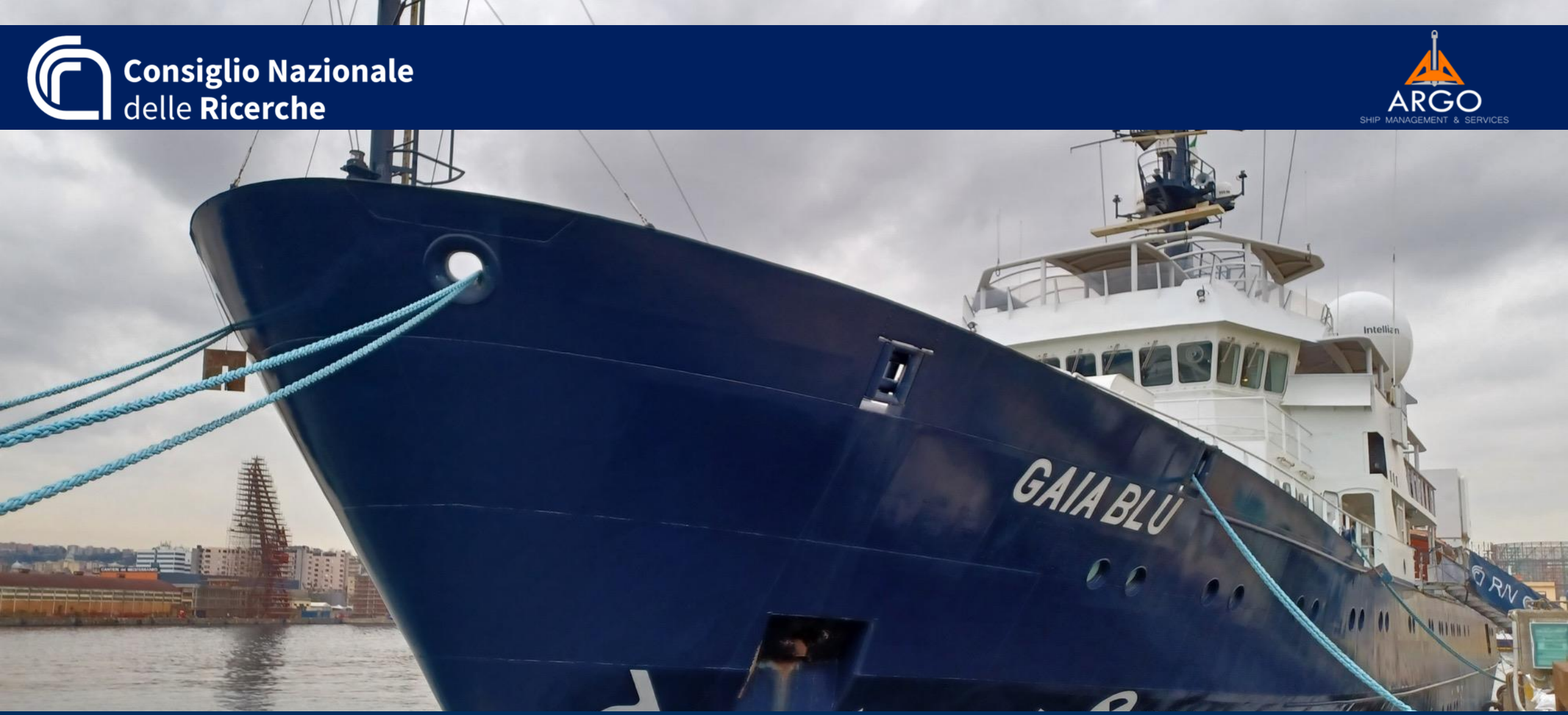
IN-HOUSE TOP LEVEL TECHNICAL SERVICES



OUR **EXPERTISE TECHNICAL TEAM OVERSEES** THE **ENTIRE DESIGN** AND **INSTALLATION** PROCESS OF **SCIENTIFIC EQUIPMENT** FOR **MARINE RESEARCH**

Consiglio Nazionale delle Ricerche

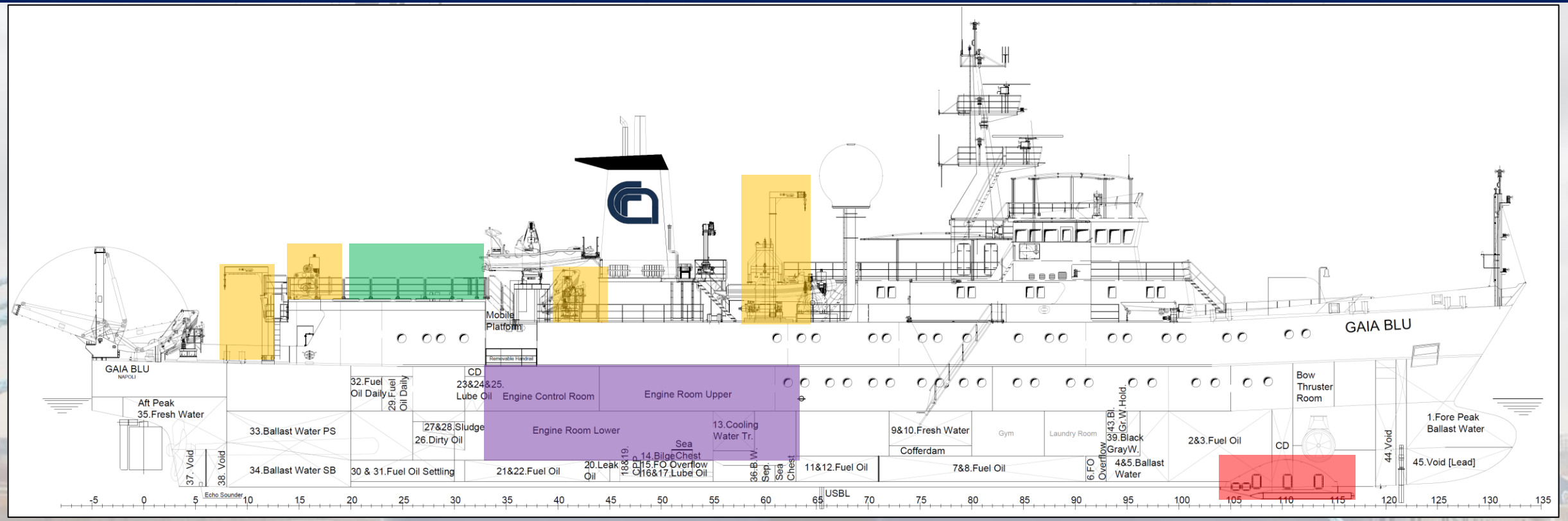
ARGO SHIP MANAGEMENT & SERVICES



GAIA BLU - IMPLEMENTATIONS

Pietro Rosiello

OVERALL PRESENTATION



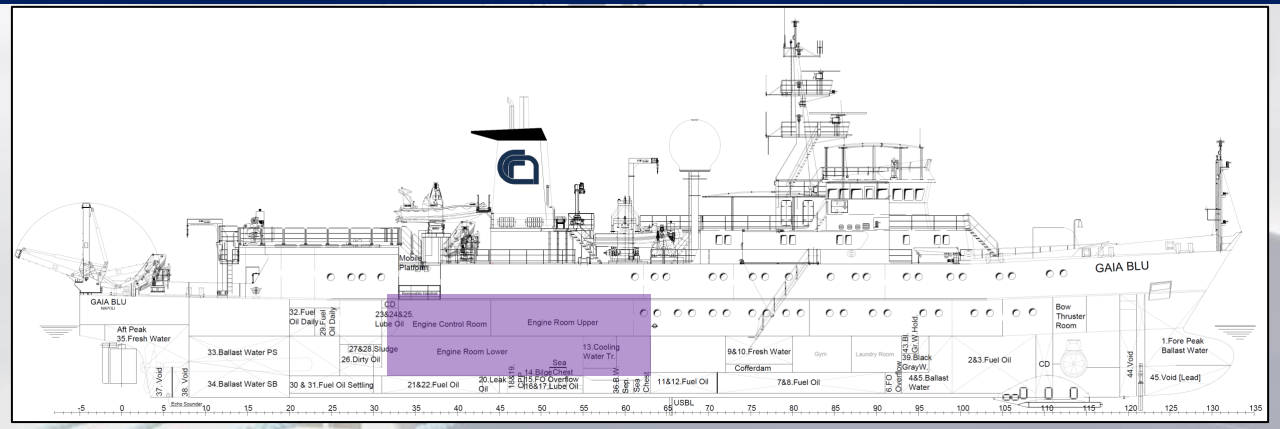
ENGINE ROOM

J-FRAME / WINCH

GONDOLA

ROV INSTALLATION

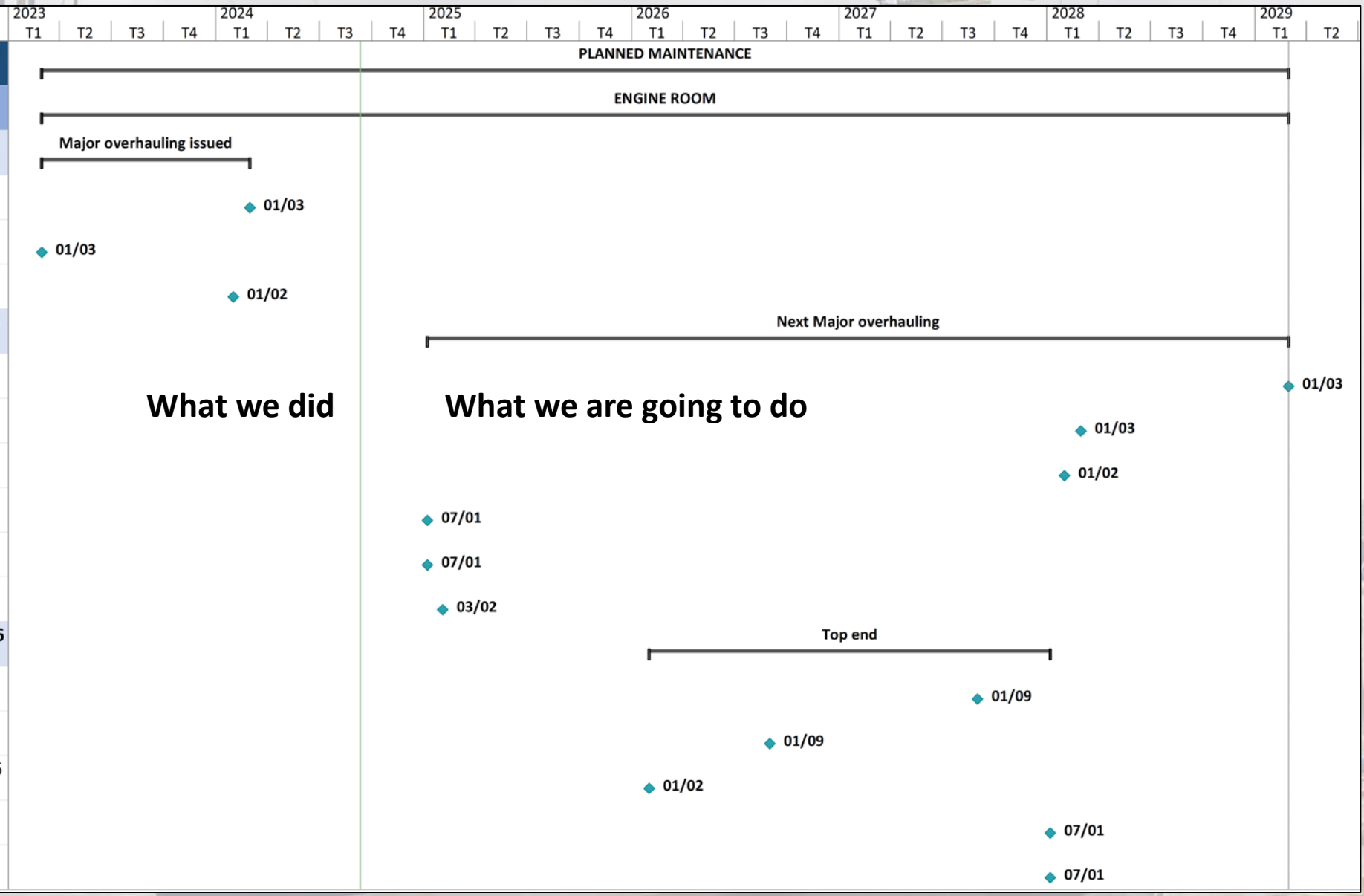
THE ENGINE ROOM



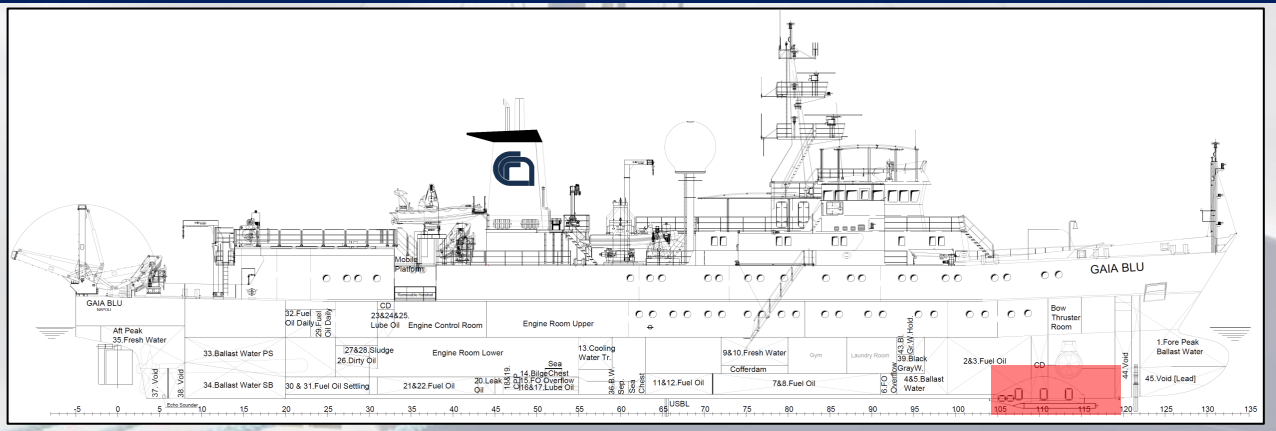
Item	Description	Power
Main Engine PS	MWM TBD 510 L8	2941 kW
Main Engine SB	MWM TBD 510 L8	2941 kW
GENSET 1	MTU 16V2000 M41A	770 kW
GENSET 2	MTU 16V2000 M41A	770 kW
GENSET 3	MAN D2842 LE301	515 kW
EM. GENSET	MAN D2840 LE201	443 kW

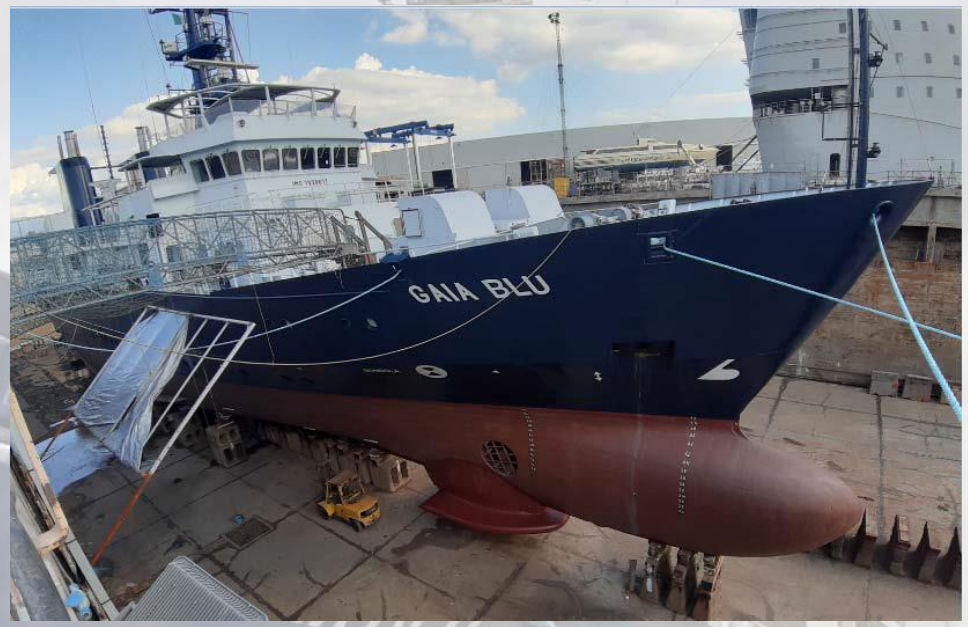
VESSEL PLANNED MAINTENANCE

Task Name	Inizio
PLANNED MAINTENANCE	**mer 01/03/23**
ENGINE ROOM	**mer 01/03/23**
Major overhauling issued	**mer 01/03/23**
MP 1 PS	ven 01/03/24
MP 1 SB	mer 01/03/23
GENSET 1	gio 01/02/24
Next Major overhauling	**mar 07/01/25**
MP 1 PS	gio 01/03/29
MP 1 SB	mer 01/03/28
GENSET 1	mar 01/02/28
GENSET 2	mar 07/01/25
GENSET 3	mar 07/01/25
EM. GEN	lun 03/02/25
Top end	**dom 01/02/26**
MP 1 PS	mer 01/09/27
MP 2 SB	mar 01/09/26
GENSET 1	dom 01/02/26
GENSET 2	ven 07/01/28
GENSET 3	ven 07/01/28



GONDOLA EQUIPMENT UPGRADING





DRY DOCK MANAGEMENT

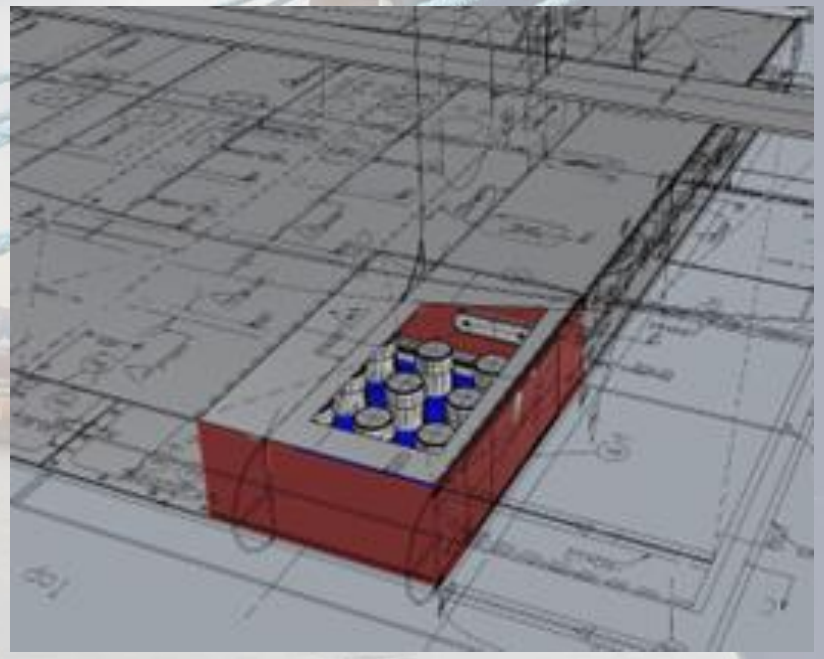
FABBRICATION AND ELECTRICAL INSTALLATION SURVEY

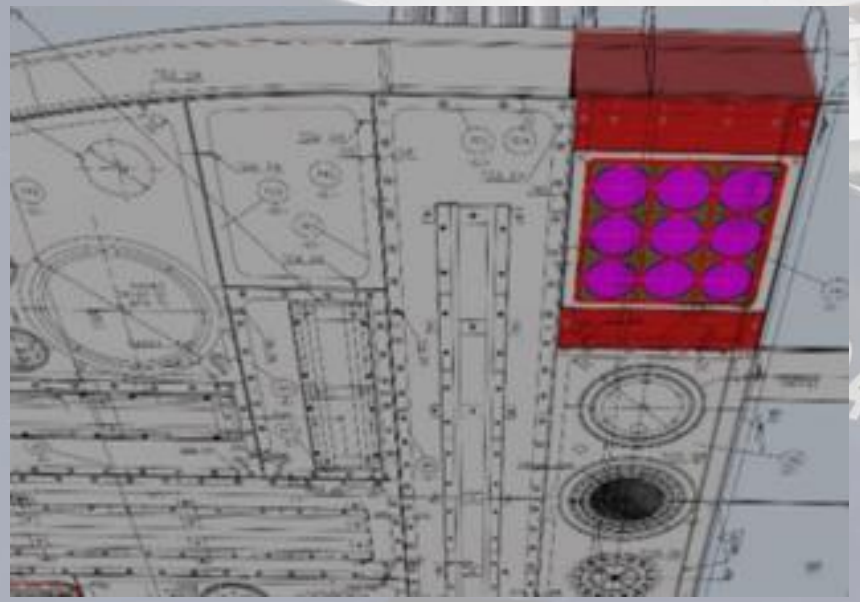
GONDOLA EQUIPMENT UPGRADING

ARGO
SHIP MANAGEMENT & SERVICES

FROM THE CONCEPT DESIGN…

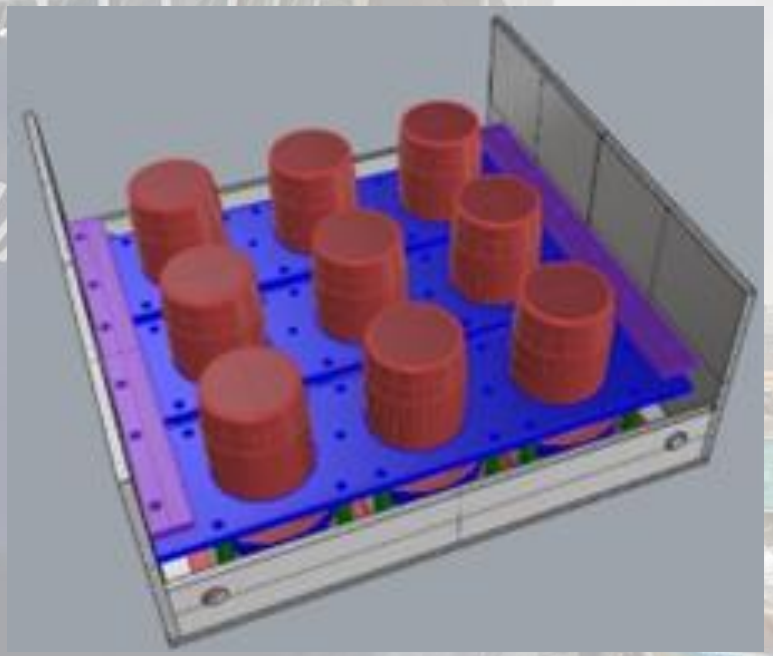
FROM 2D TO 3D





POSITIONING

SUPPORTING FRAME CREATION



GONDOLA EQUIPMENT UPGRADING & COMMISSIONING

ARGO
SHIP MANAGEMENT & SERVICES

…TO THE INSTALLATION

NEW FRAME
INSTALLATION

ELECTRICAL
INSTALLATION

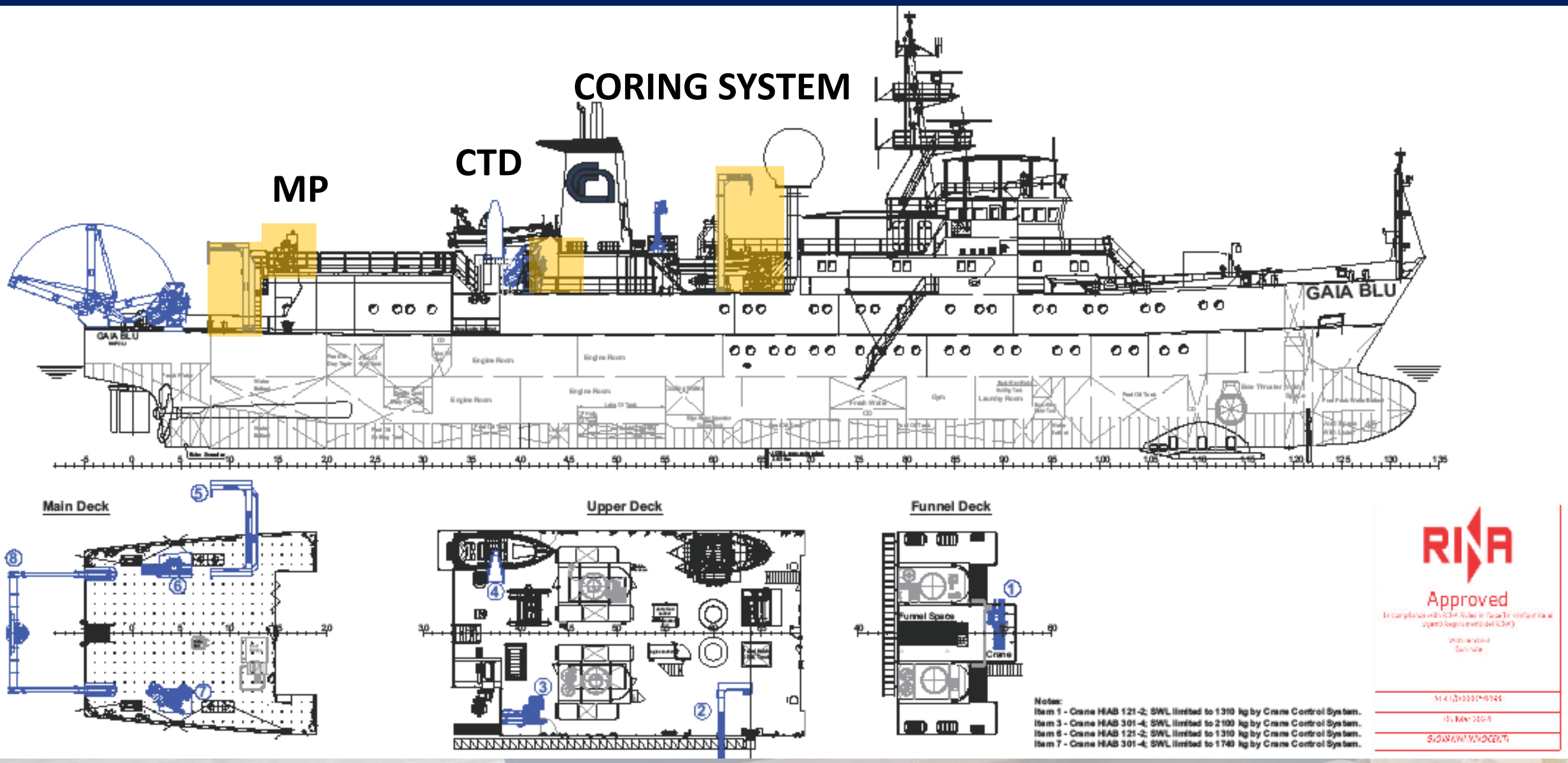
TEST ISSUED
HARBOUR ACCEPTANCE TEST (HAT)
SEA ACCEPTANCE TEST (SAT)
CUSTOMER ACCEPTANCE TEST (CAT)

EQUIPMENT POSITIONING

FINAL RESULT

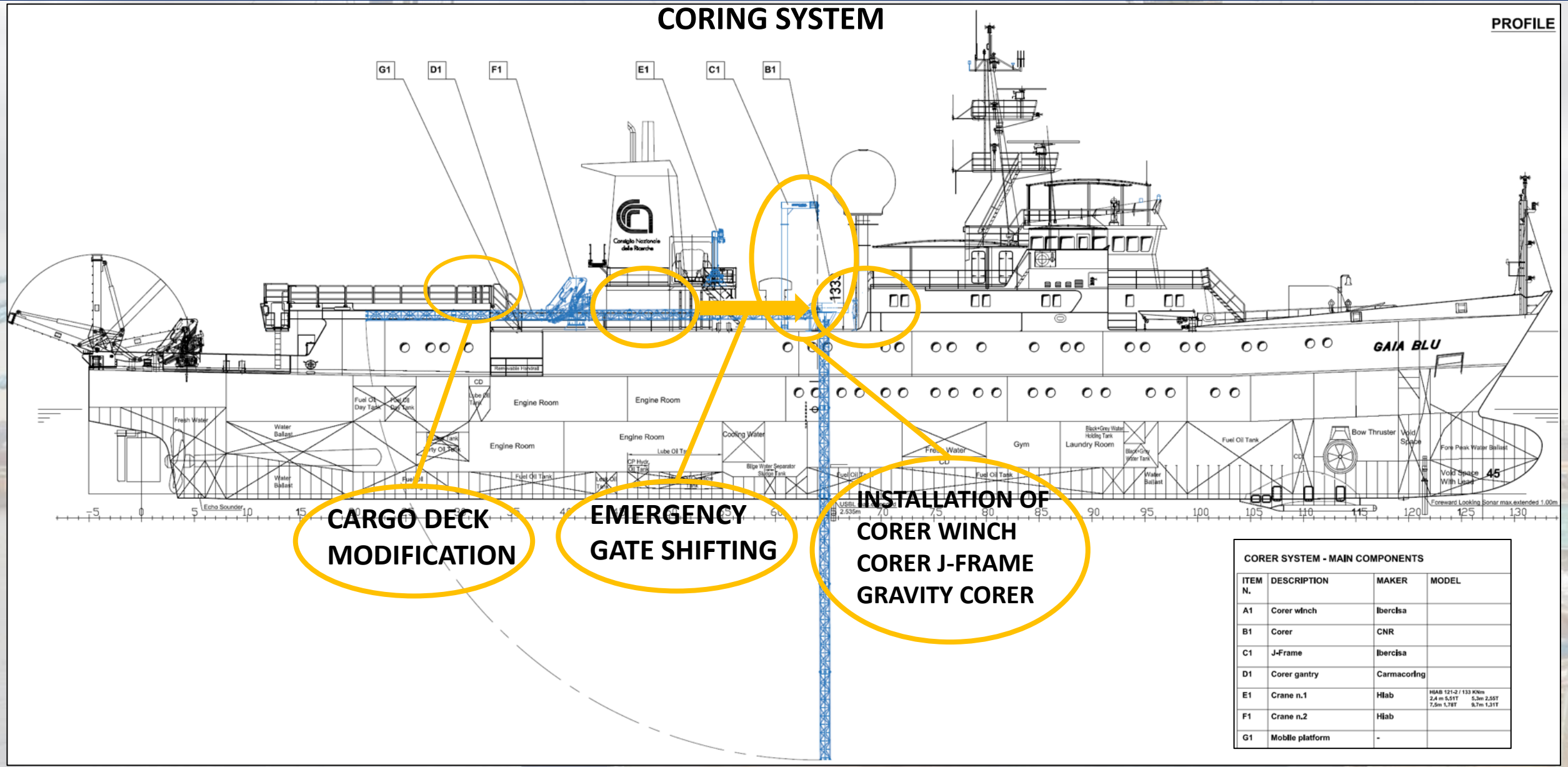
REASEARCH DEPLOYMENT SYSTEMS

ARGO
SHIP MANAGEMENT & SERVICES



CORING SYSTEM – VESSEL MODIFICATION

CORING SYSTEM



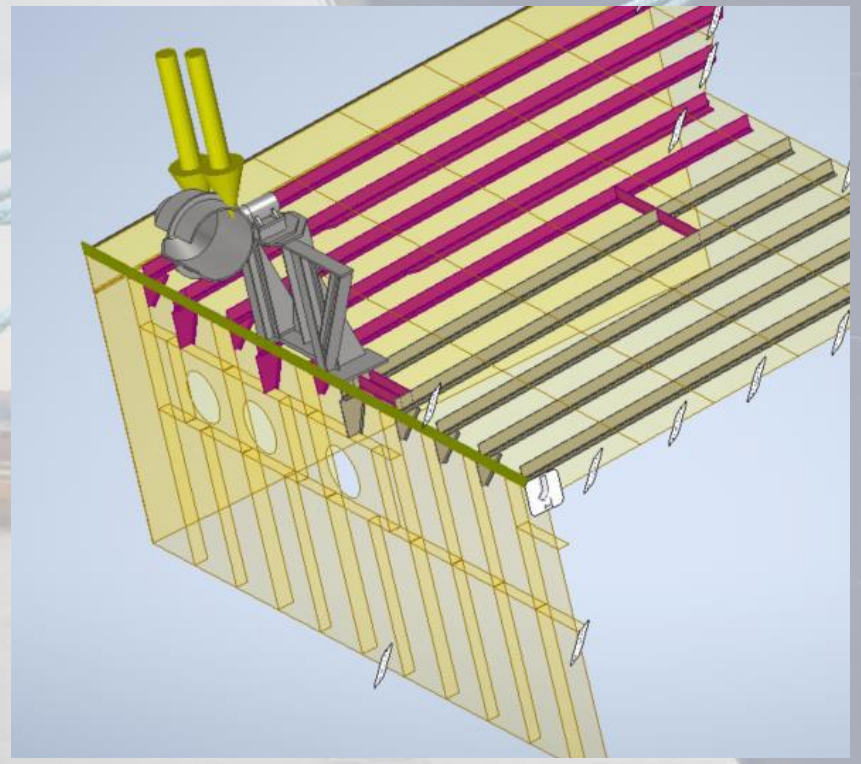
CORER SYSTEM - MAIN COMPONENTS

ITEM N.	DESCRIPTION	MAKER	MODEL
A1	Corer winch	Ibercisa	
B1	Corer	CNR	
C1	J-Frame	Ibercisa	
D1	Corer gantry	Carmacoring	
E1	Crane n.1	Hiab	HIAB 121-2 / 133 KNm 2,4 m 5,51T 5,3m 2,55T 7,5m 1,78T 9,7m 1,31T
F1	Crane n.2	Hiab	
G1	Mobile platform	-	

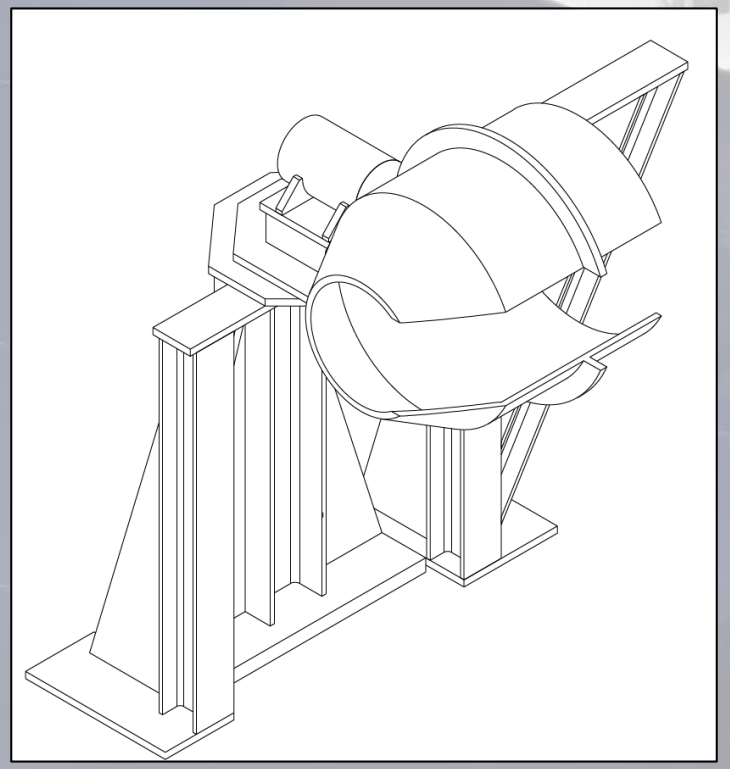
CORING SYSTEM – DESIGN

GRAVITY CORER

HULL STRUCTURE CHECK



INSTALLATION DRAWINGS

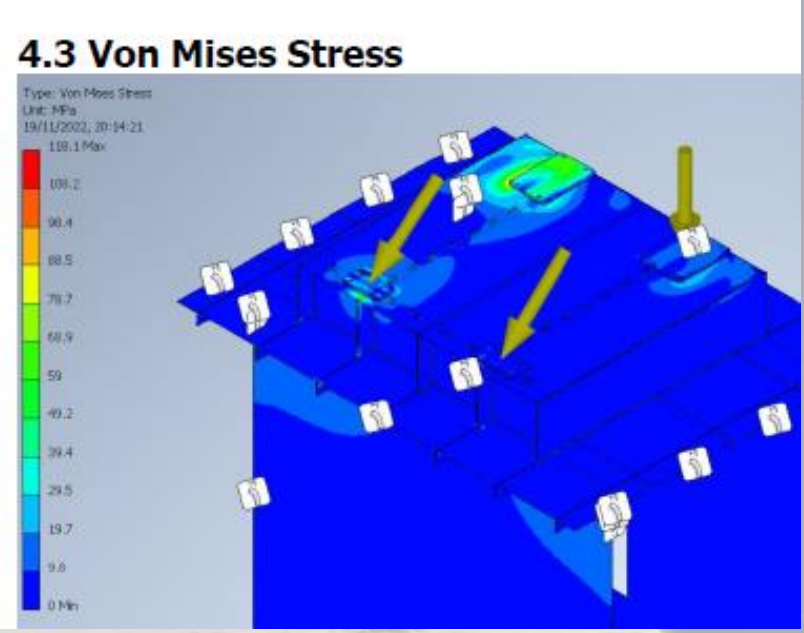


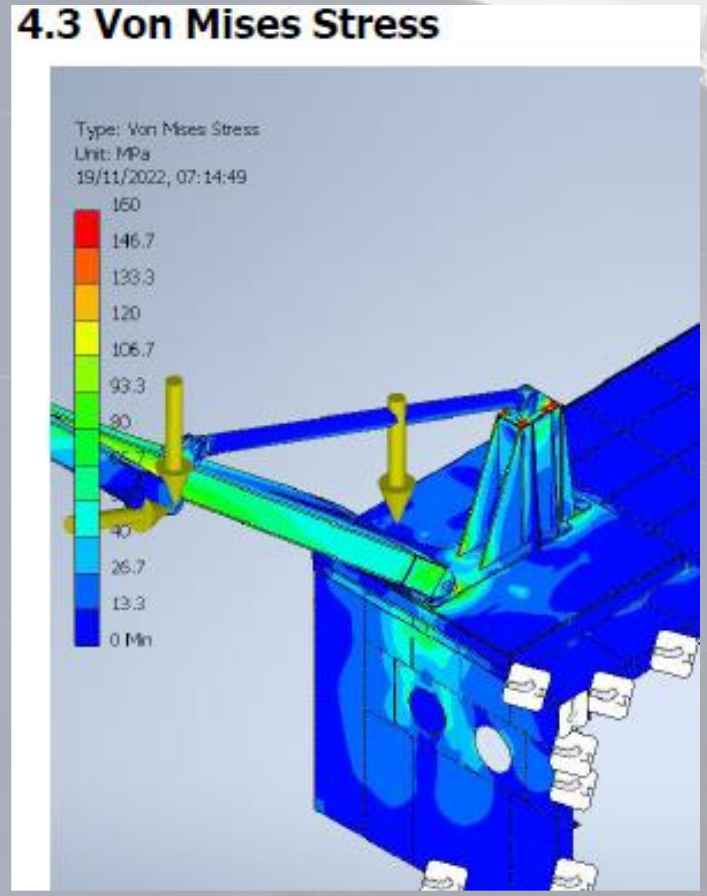
INSTALLATION SUPERVISION

CORING SYSTEM – DESIGN

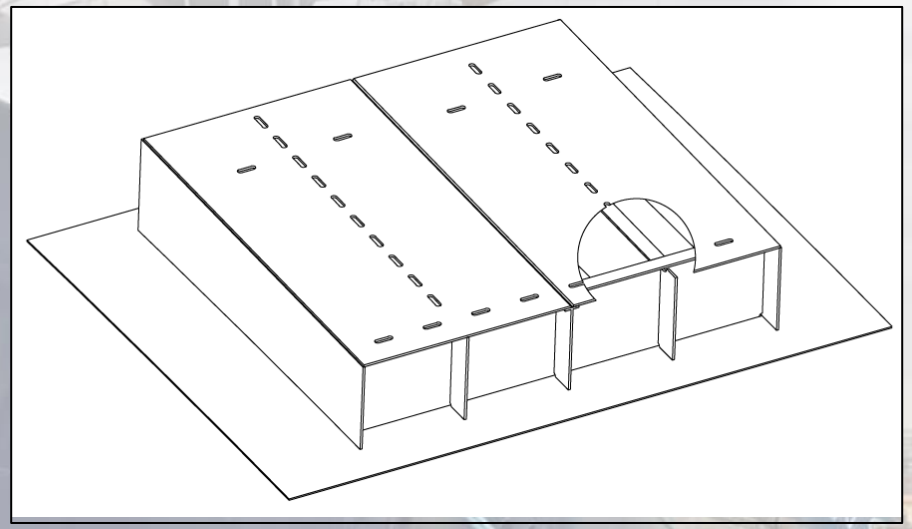
J-FRAME AND FOUNDATION

FEM CALCULATION



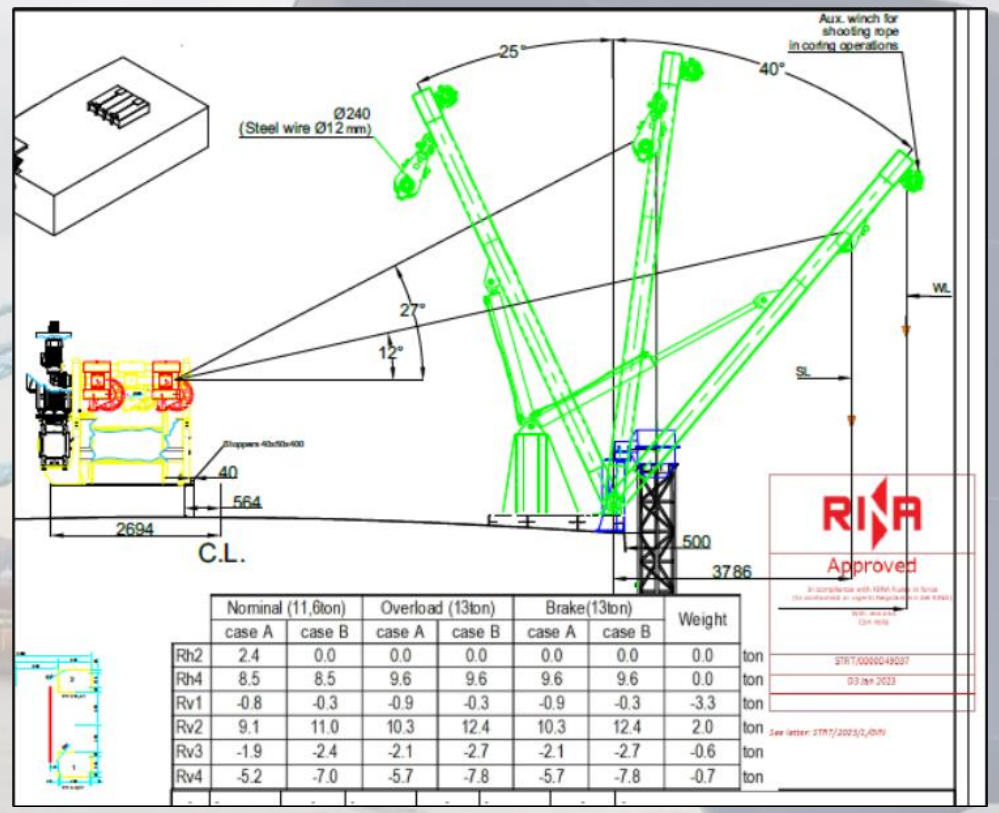


INSTALLATION DRAWINGS



CORING SYSTEM – INSTALLATION

CLASS APPROVAL



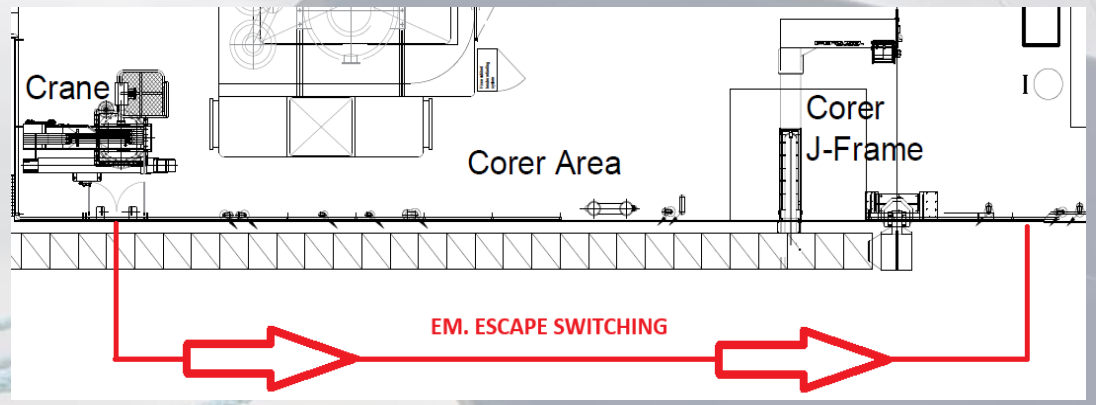
	Nominal (11,6ton)		Overload (13ton)		Brake(13ton)		Weight	
	case A	case B	case A	case B	case A	case B		
Rh2	2.4	0.0	0.0	0.0	0.0	0.0	0.0	ton
Rh4	8.5	8.5	9.6	9.6	9.6	9.6	0.0	ton
Rv1	-0.8	-0.3	-0.9	-0.3	-0.9	-0.3	-3.3	ton
Rv2	9.1	11.0	10.3	12.4	10.3	12.4	2.0	ton
Rv3	-1.9	-2.4	-2.1	-2.7	-2.1	-2.7	-0.6	ton
Rv4	-5.2	-7.0	-5.7	-7.8	-5.7	-7.8	-0.7	ton

INSTALLATION SUPERVISION

CORING SYSTEM – INSTALLATION

EMERGENCY GATE SHIFTING

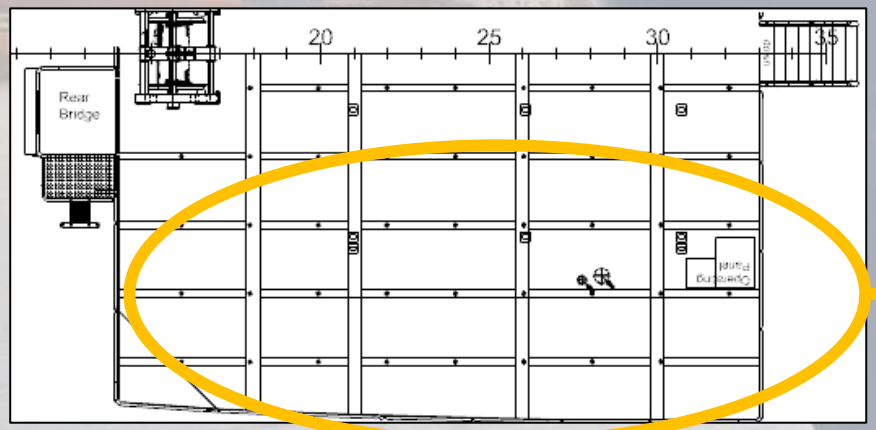
BEFORE

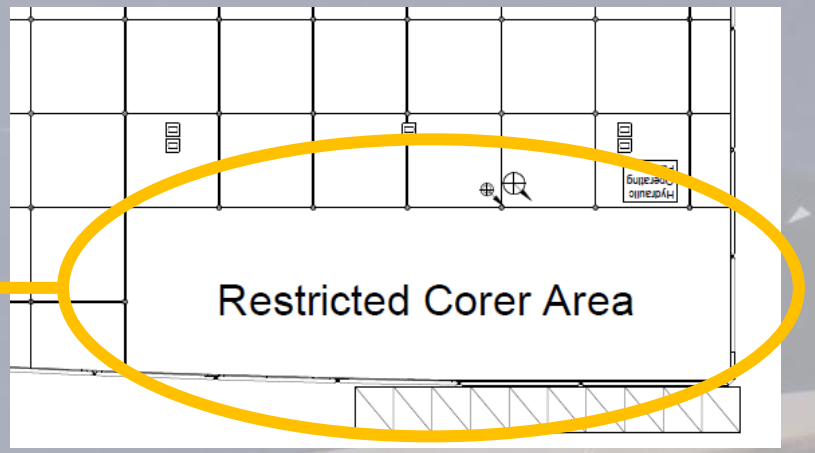


AFTER

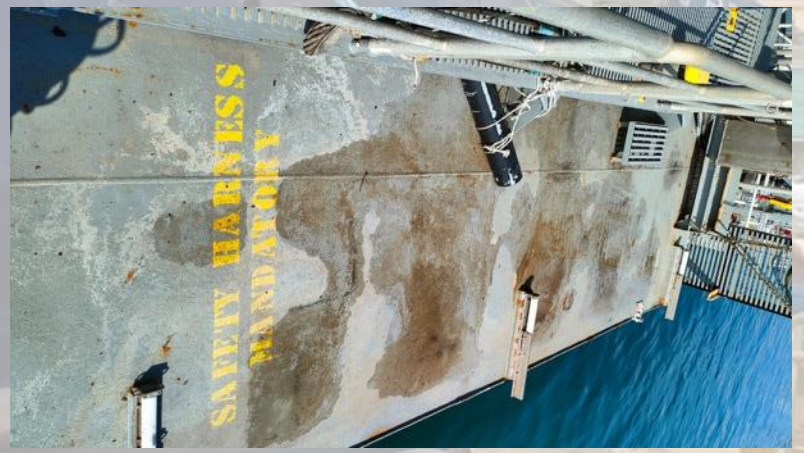
CARGO DECK MODIFICATION

BEFORE



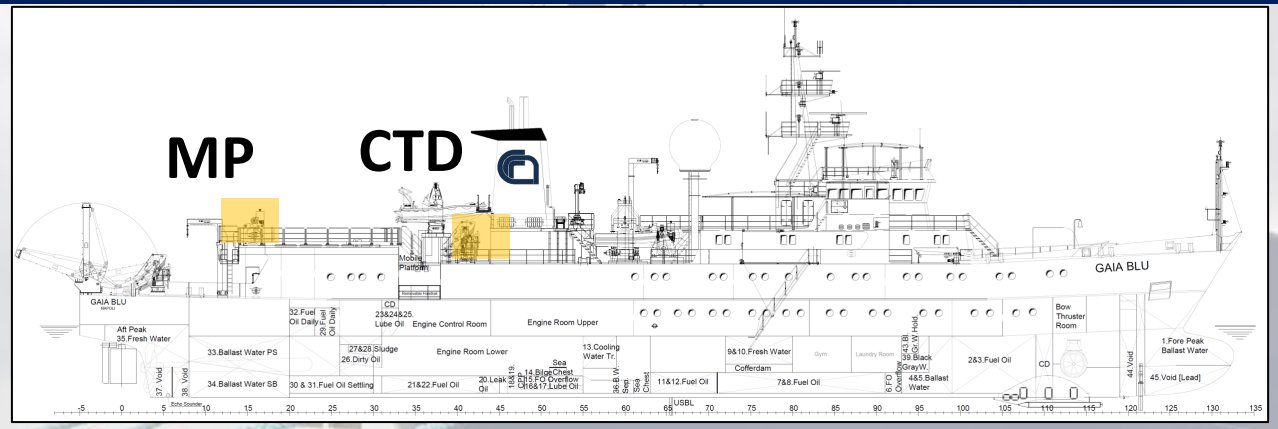


AFTER



RESEARCH DEPLOYMENT SYSTEM – CTD AND MP

ARGO
SHIP MANAGEMENT & SERVICES



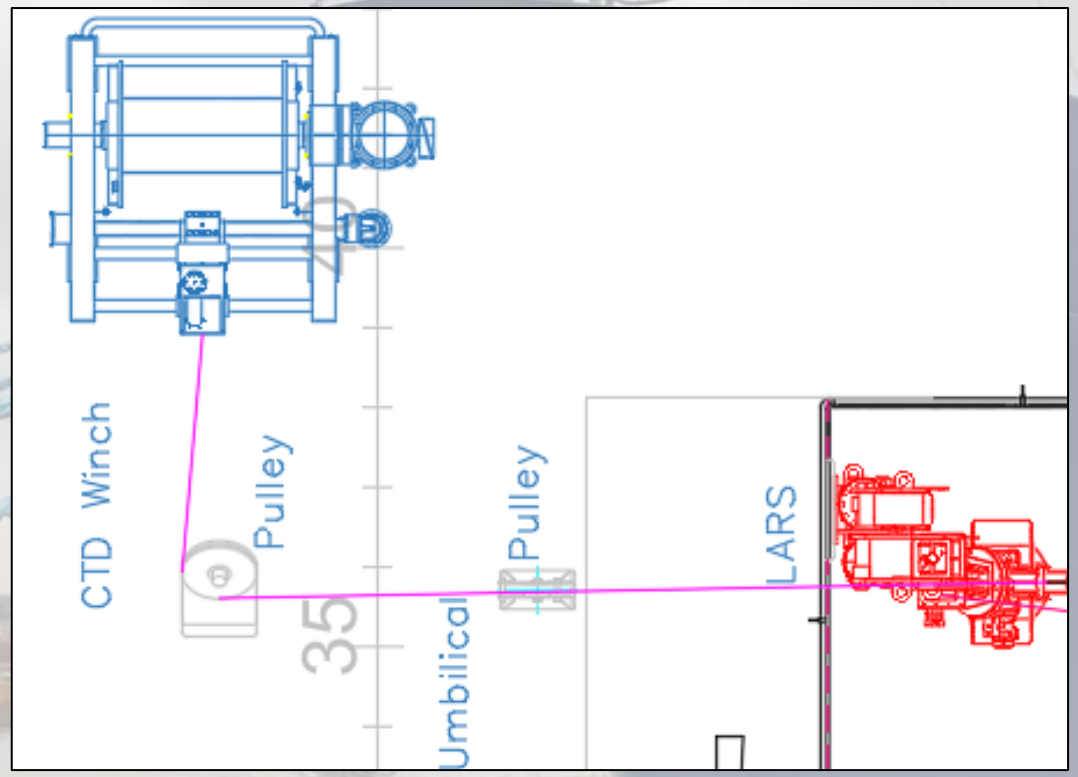
LOCATED ON CARGO DECK, CONNECTED TO A-FRAME

LOCATED ON MAIN DECK, CONNECTEDTO LARS

RESEARCH DEPLOYMENT SYSTEM – DESIGN

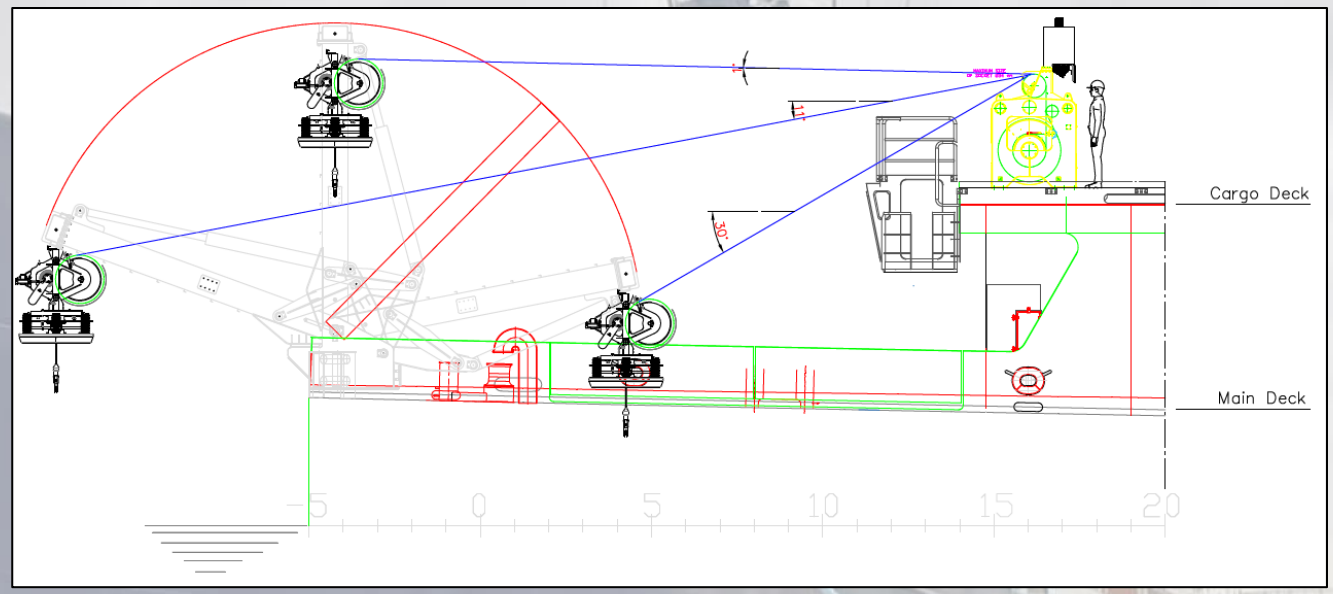
ARGO
SHIP MANAGEMENT & SERVICES

CTD



CTD ADAPTATION TO THE EXISTING LARS

MULTIPURPOSE

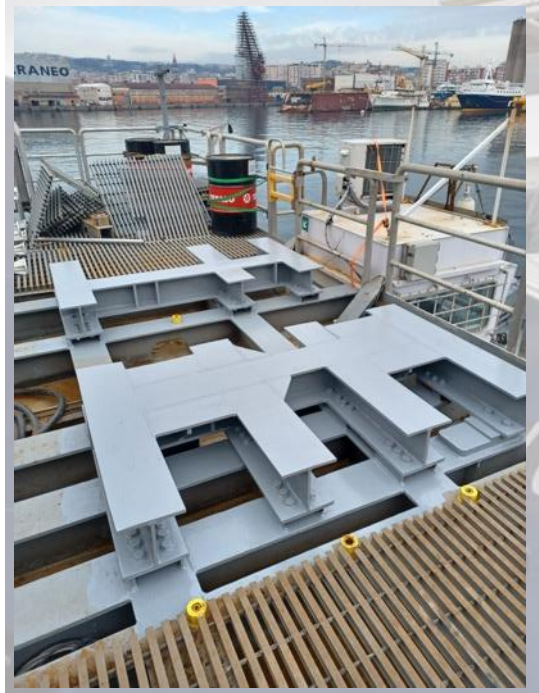


MP CONNECTED TO THE A-FRAME

RESEARCH DEPLOYMENT SYSTEM – INSTALLATION

ARGO
SHIP MANAGEMENT & SERVICES

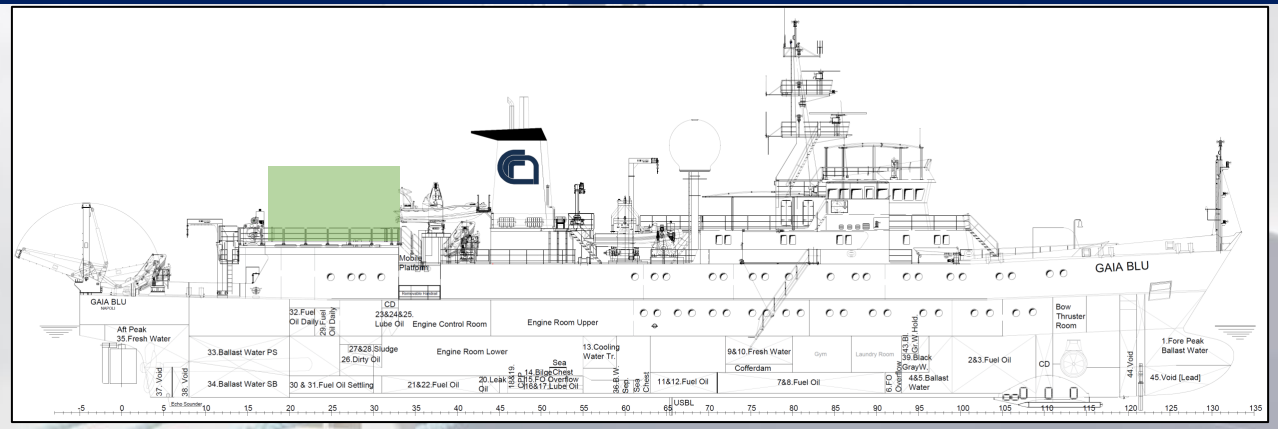
INSTALLATION ACTIVITIES

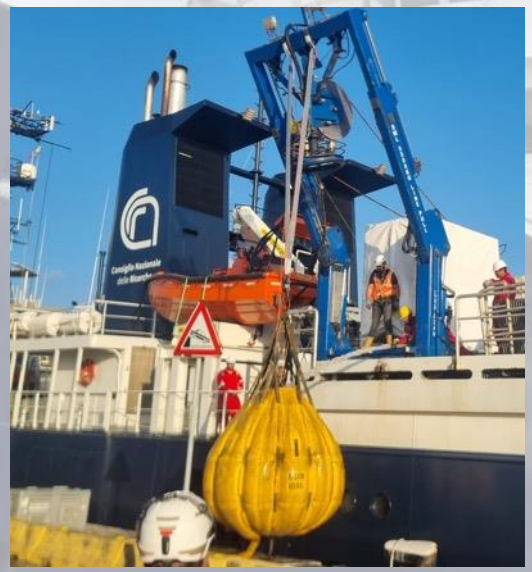


ELECTRICAL CONNECTION

FABBRICATION WORKS

ROV INSTALLATION





ENGINEERING

- FEASIBILITY STUDY
- STABILITY CALCULATION
- GRILLAGE & SEA-FASTENING DESIGN

SUPERVISION

- INSTALLATION AND NDT TEST
- LARS POSITIONING
- LARS LOAD-TEST

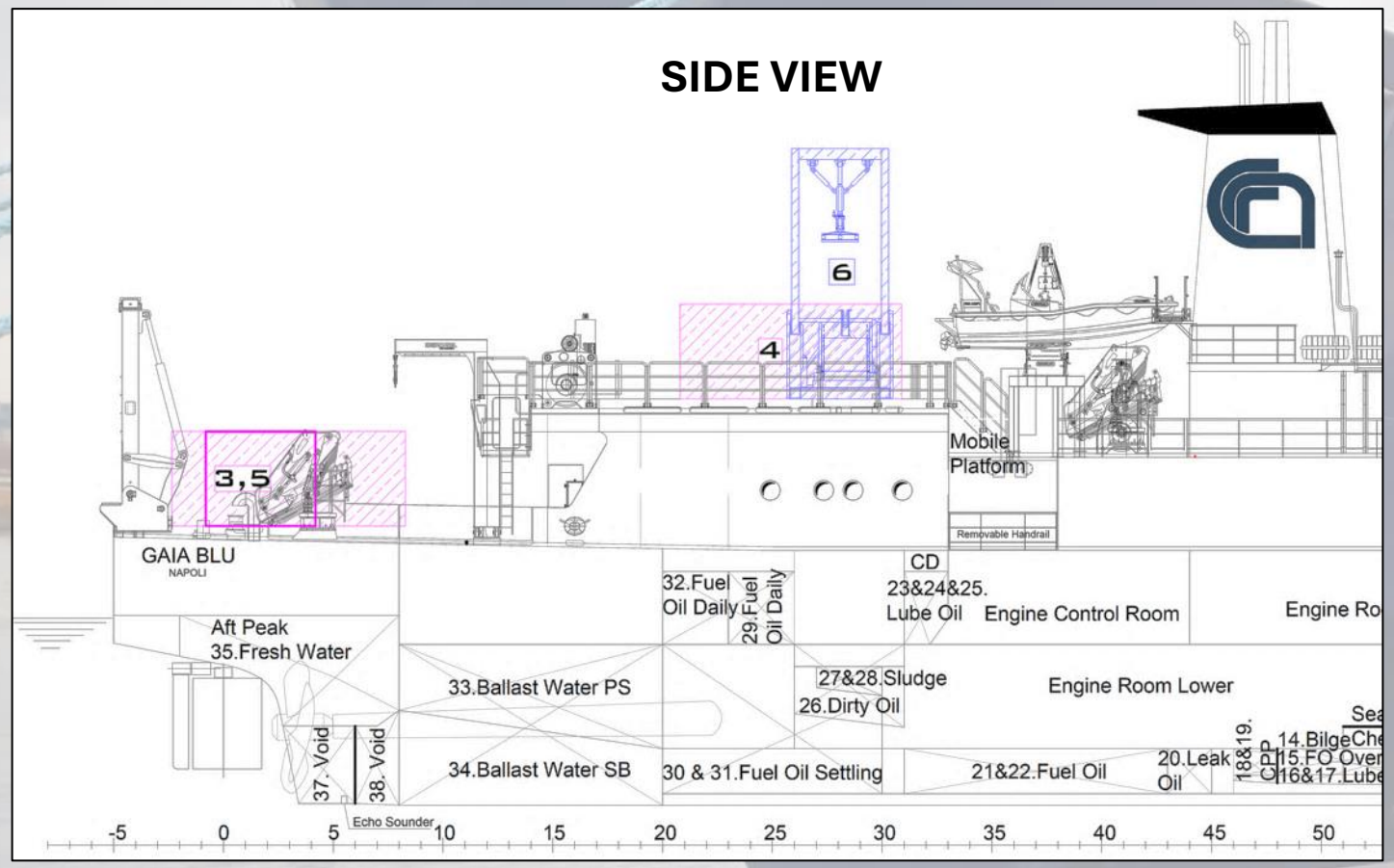
ROV INSTALLATION – LIGHT WORK CLASS

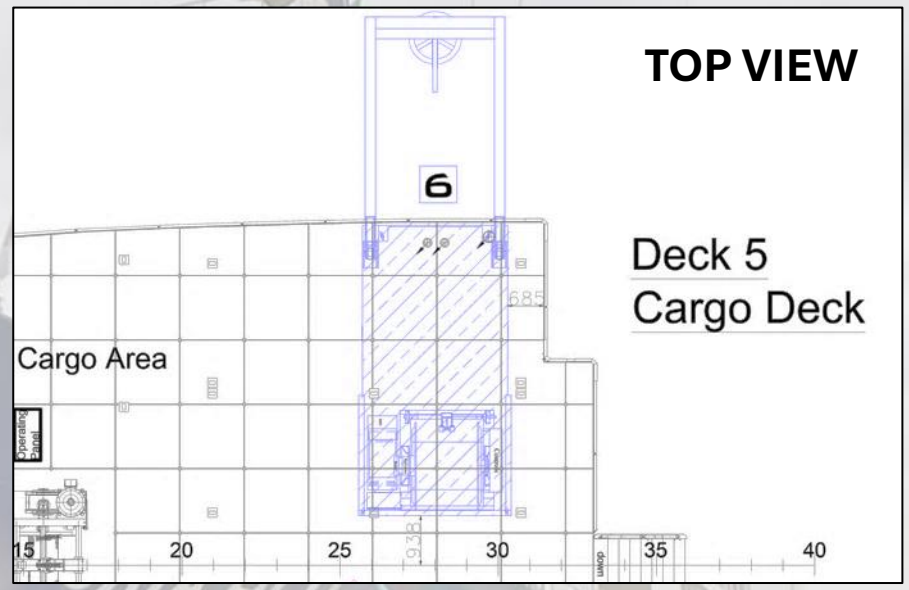
ARGO
SHIP MANAGEMENT & SERVICES

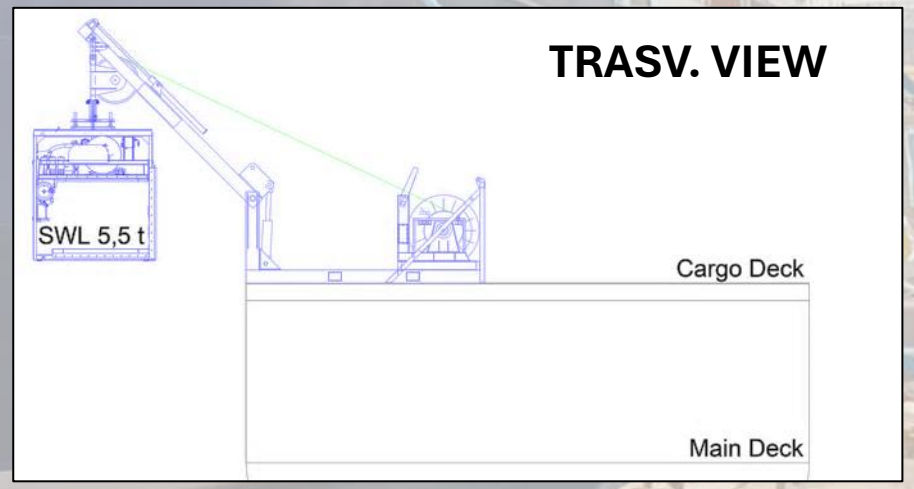
LAYOUT

FEASIBILITY STUDY

1 ST CASE, ROV ON CARGO DECK

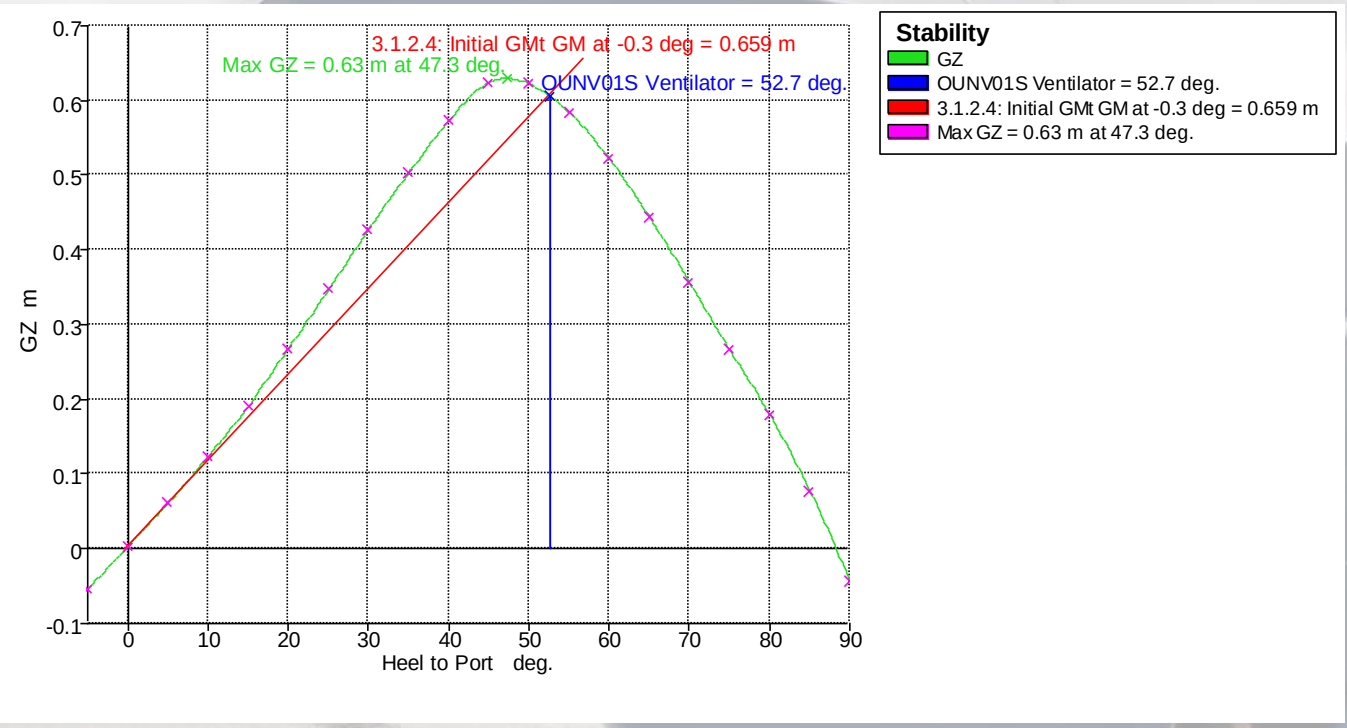






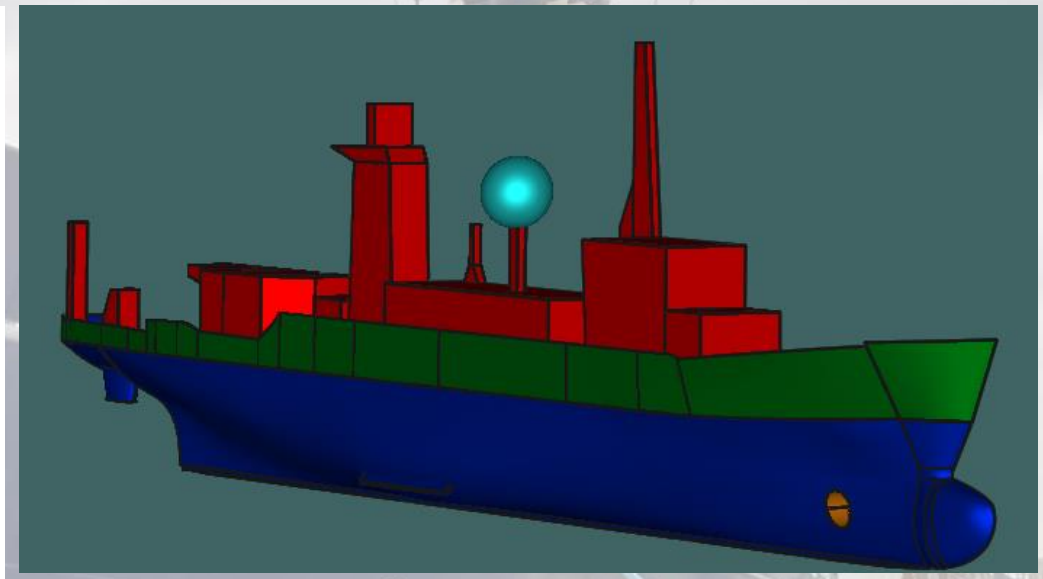
ROV INSTALLATION – LIGHT WORK CLASS

STABILITY CALCULATION



Stability

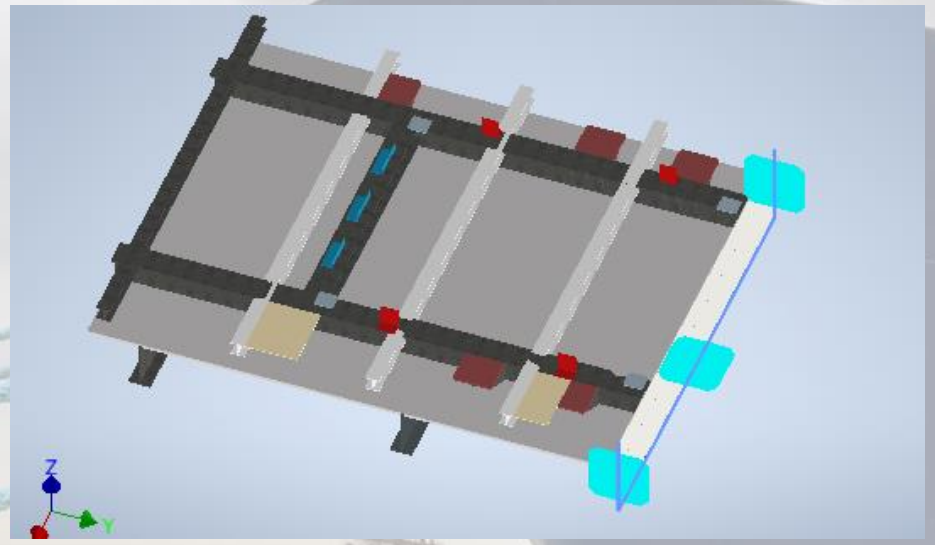
- GZ
- OUNV01S Ventilator = 52.7 deg.
- 3.1.2.4: Initial GMt GM at -0.3 deg = 0.659 m
- Max GZ = 0.63 m at 47.3 deg.

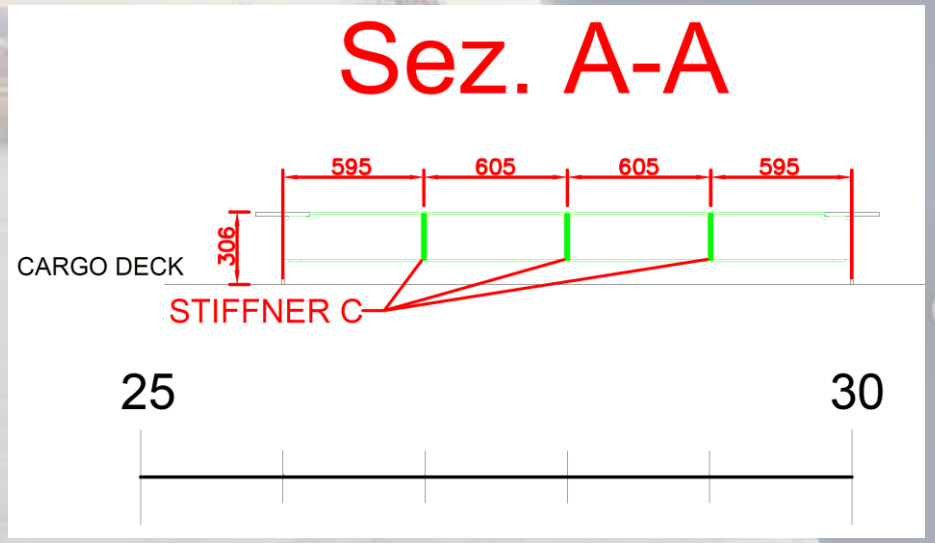


Code	Criteria	Value	Units	Actual	Status	Margin %
A.749(18) Ch3 - Design criteria applicable to all ships	3.1.2.1: Area 0 to 30	0.055	m.rad	0.1052	Pass	91.2
A.749(18) Ch3 - Design criteria applicable to all ships	3.1.2.1: Area 30 to 40	0.03	m.rad	0.0877	Pass	192.42
A.749(18) Ch3 - Design criteria applicable to all ships	3.1.2.2: Max GZ at 30 or greater	0.2	m	0.63	Pass	215
A.749(18) Ch3 - Design criteria applicable to all ships	3.1.2.3: Angle of maximum GZ	25	deg	47.3	Pass	89.09
A.749(18) Ch3 - Design criteria applicable to all ships	3.1.2.4: Initial GMt	0.15	m	0.659	Pass	339.33
A.749(18) Ch3 - Design criteria applicable to all ships	3.1.2.1: Area 0 to 40	0.09	m.rad	0.1929	Pass	114.32

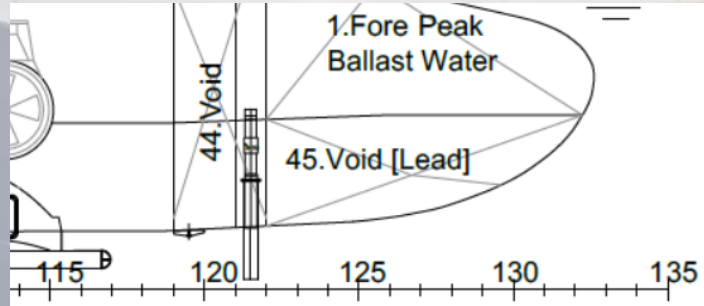
ROV INSTALLATION – LIGHT WORK CLASS

FEM ANALISYS AND DRAWINGS





CLASS APPROVAL



BILL OF MATERIAL	
DESCRIPTION	Q.ty
Beam HE 220	abt 2.4m
Sea fastening Type A	NR. 4
Sea fastening Type B	NR. 3
Stiffener Type C	NR. 6

RINA

Approved

In compliance with RINA Rules in force
(In conformità ai vigenti Regolamenti del RINA)

With remarks
Con note

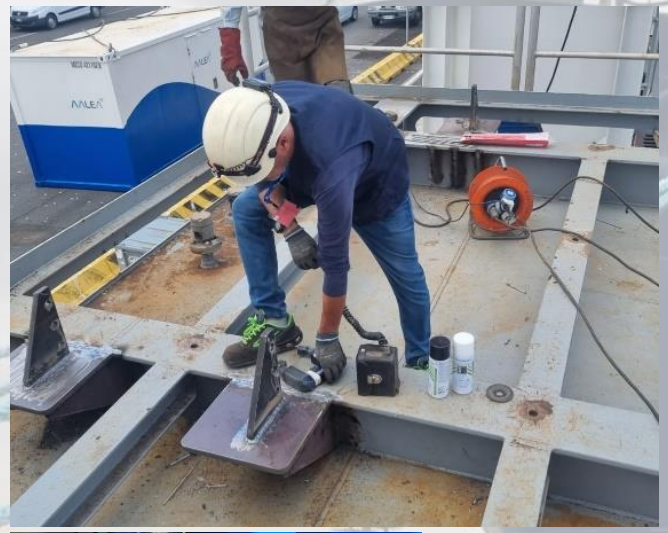
STRT/0000057848

05 Sep 2024

ROV INSTALLATION – LIGHT WORK CLASS

ARGO
SHIP MANAGEMENT & SERVICES

INSTALLATION SUPERVISION



FABBRICATION AND NDT TEST

LARS POSITIONING

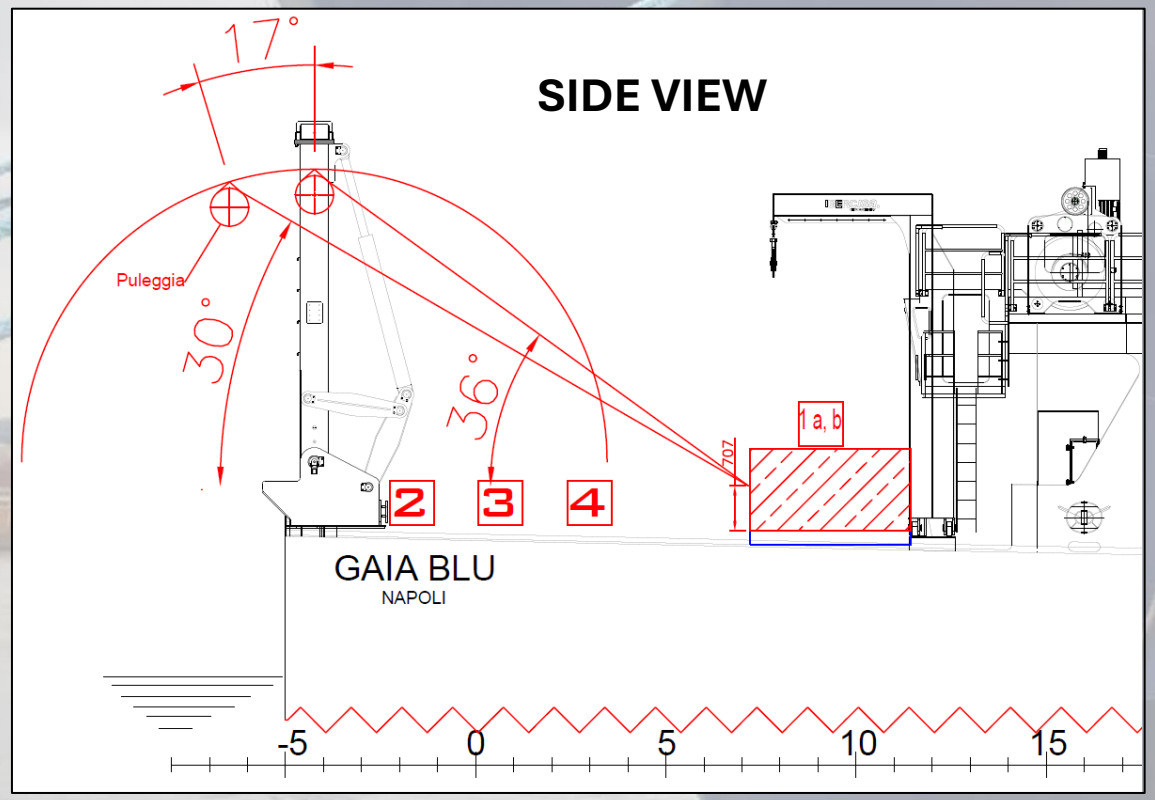
LARS LOAD-TEST

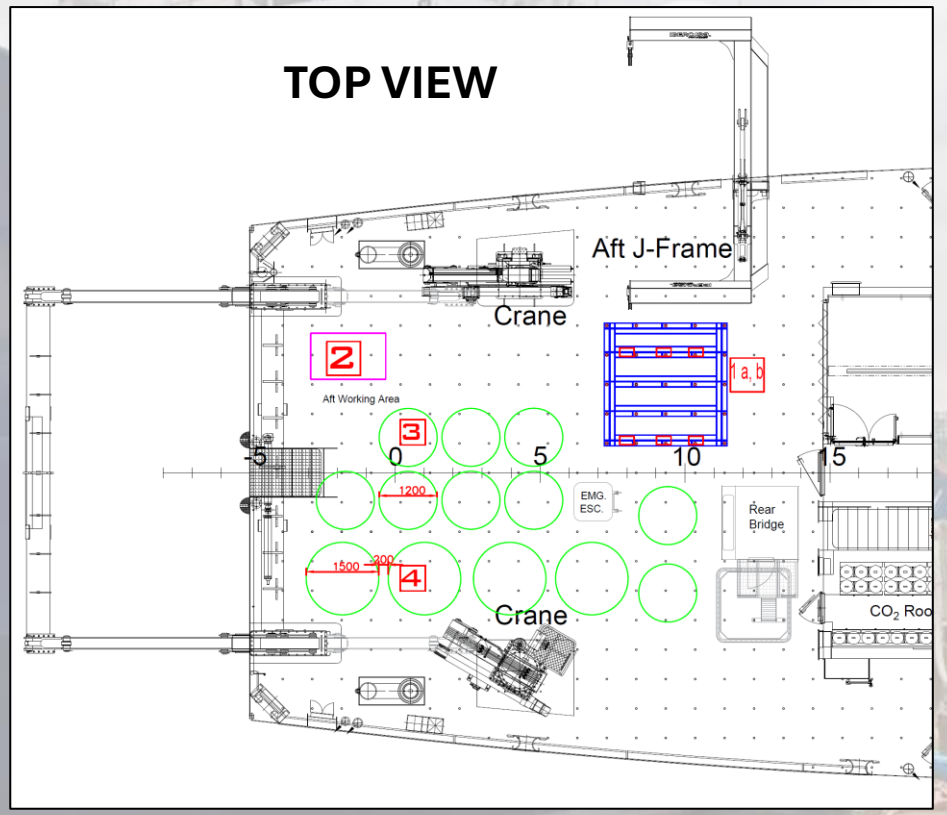
ROV INSTALLATION – OBSERVATION CLASS

FEASIBILITY STUDY

LAYOUT

2 ND CASE, ROV ON MAIN DECK WITH A-FRAME

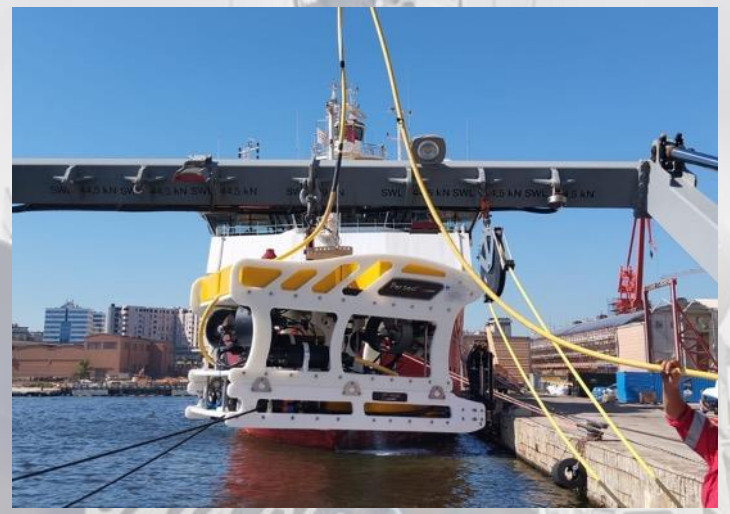




ROV INSTALLATION – OBSERVATION CLASS

ARGO
SHIP MANAGEMENT & SERVICES

MOB OPERATION



WINCH POSITIONING

Consiglio Nazionale delle Ricerche

ARGO SHIP MANAGEMENT & SERVICES

“Nothing is lost. . .Everything is transformed !”
Michael Ende, The Neverending Story

Thank you for the attention