

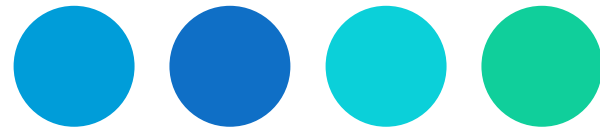


A holistic
passenger
ship
evacuation
and rescue
ecosystem

PALAEMON – Meeting 23-03-2023

The awesomeness focused





▶ MEV

...

WP4

INTRODUCTION

WP4 Palaemon Mass Evacuation Vessel

- ▶ The Palaemon project proposes a new safe boat design on the sides of the ship with a large floating composite structure that will serve as the MEV-I real prototype and MEV II conceptual design, which can be integrated in the future with the rest of the ship's superstructure.
- ▶ During the last months, work has been done on the design, manufacture and validation of the first real MEV-I prototype with a new ecological material, recycled, which currently does not exist on the market. And to design a concept of MEV-II

PARTICIPANTS

► *Participants in work package 4*

All partners have great experience each in their sector. In case of Astander as coordinators of WP4 we have more than 150 years of history repairing, building and retrofitting great transformations focused on safety and the environment in vessels and Astander is a company with shipyards in Europe and Central America as well as shipping companies specialized in bulkcarriers.

ESI- Engitec systems international.

NTUA- National technical university of Athens.

EFB- Engineers for business.

DNV GL.

ANEK- Shipping company of crete Sa Aneklines.

OELSR- Oesterreichischer Lloyds Seereederei LTD.

AST- Astilleros de Santander SAU.

JOHANNITER

SURVITEC

OBJECTIVES

- ▶ 4 task and descriptions WP4

01

T4.1 MEV TYPE-I

Composite
Floating Structure

▶ DONE



02

T4.2 MEV TYPE-II

▶ Part of ship
superstructure

▶ DONE



03

T4.3 MEV

▶ Design and
implementation of
inflatable
structure

▶ DONE



04

T4.4 MEV

▶ Interior Design
Methodologies

▶ DONE



- ▶ THIS SECTION OF PROJET IS COORDINATOR BY ASTANDER S.A.U.

Deliverables

D4.1 Naval architecture studies, GA and lines of MEV-I

▶ (yes) Start- end M12- may 2020)-
APPROVED

▶ D4.2 Design and analysis of MEV-I and structural drawings

▶ SUBMITTED

▶ D4.3 Manufacturing of MEV-I ate
Prototype

▶ SUBMITTED

▶ D4.4 MEV-II naval architecture and structural design

▶ SUBMITTED

Deliverables

D4.5 Design of inflatables structures

▶ SUBMITTED

▶ D4.6 Manufacturing and integration of inflatables on MEV-I

▶ SUBMITTED

▶ D4.7 MEV interior's user requirements report

▶ SUBMITTED

▶ D4.8 MEV interior's detailed designs

▶ SUBMITTED

Deliverables

D4.9 MEV interior's detailed designs

▶ SUBMITTED

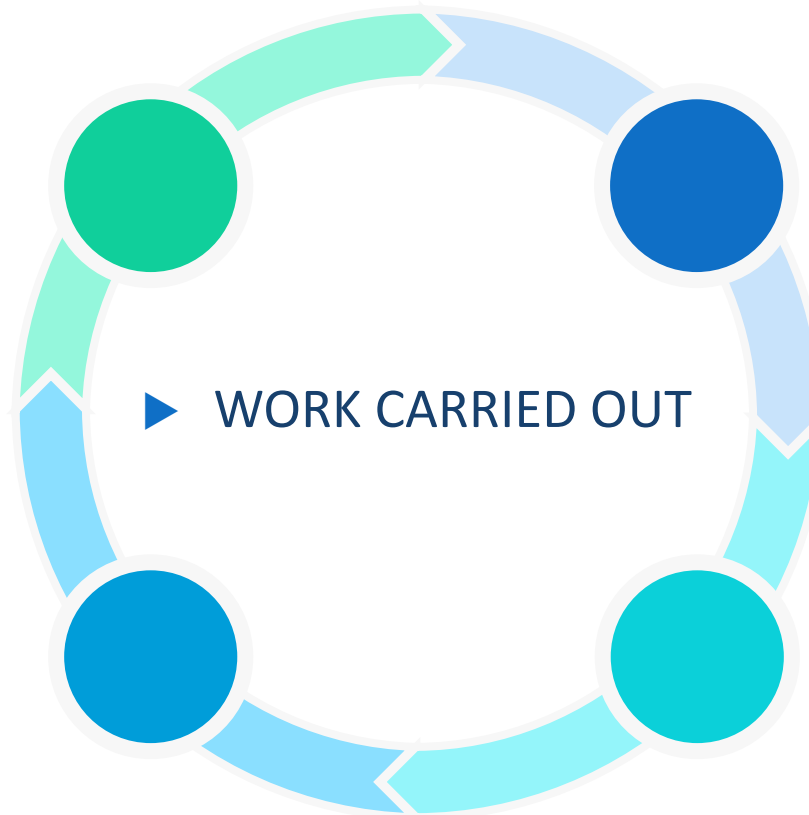
▶ D4.10 Public abstract of D4.4 ▶ SUBMITTED

▶ D4.4. MEV-II naval architecture and structural design

- ▶ Design of MEV II and integration on Cruise ship, Structural analysis and drawings of concept
- ▶ Defining and designing according to the requirement of a possible safe boat with two decks and implementing the learning of design, hydrostatics and stability calculations of the MEV-I

▶ D4.3 Manufacturing of MEV-I

- ▶ Final manufacturing drawings.
- ▶ The construction of the prototype of the MEV-I is carried out



▶ D4.1 MEV TYPE-I Composite Floating Structure- ASTANDER:

- ▶ The design of the naval architecture of the prototype has been carried out, considering its stability, behavior, propulsive power...

▶ D4.2 MEV TYPE-II Part of ship superstructure- ESI

- ▶ Once the materials and design of the MEV had been defined, the final design began, including its analysis with a 3D model and the final drawings.
- ▶ FEA (finite element analysis).

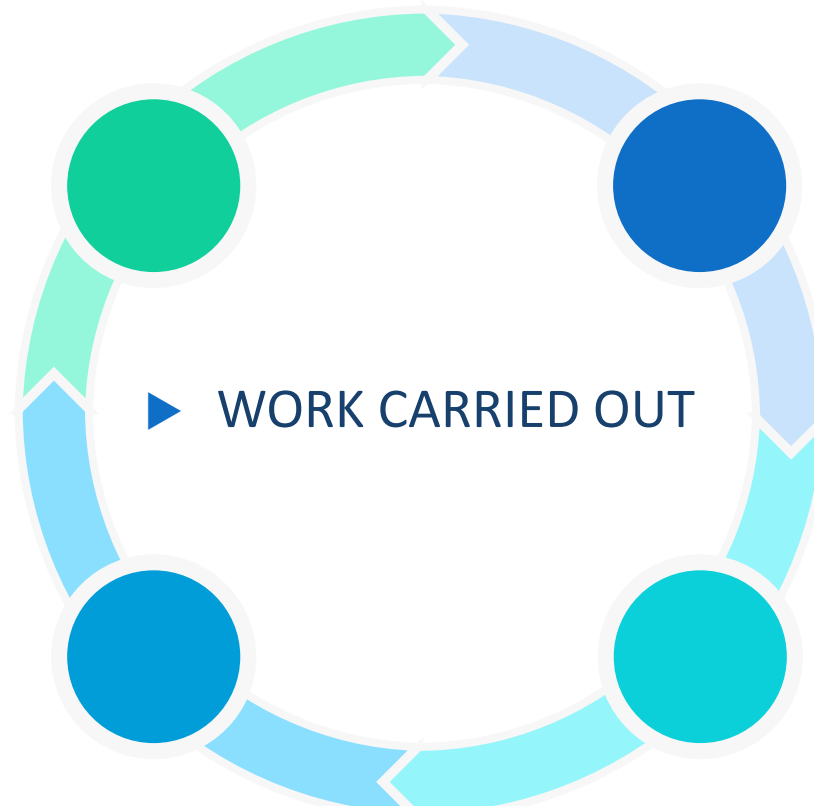
▶ **D4.8 MEV I interior's detailed designs**

- ▶ Implementing the maximum that can be according to the needs of the prototype TRL. To 40 points review more than 20 points were implemented.
- ▶ Testing with people and user

▶ **D4.7. MEV interior's user requirements report**

- ▶ Defining according to the requirement of code Solas and contributions from all partners and

▶ **D4.9. MEV II interior's detailed designs . Simulate interiors.**



▶ **D4.10. Public abstract was published for Astander customer**

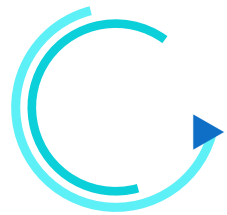
▶ **D4.5 Design if inflatables structures)**

- ▶ The design of the MEV-I floats is carried out, considering the materials and the inflation of the floats.

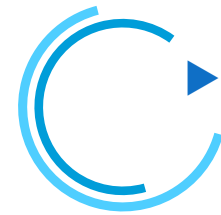
▶ **D4.6. Manufacturing and integration of inflatables on MEV-I**

- ▶ Manufacturing and installation of the floats on the MEV-I demo structure is carried out. Redesigning of the connection structure due to biomaterial

4.1 MEV TYPE-I Composite Floating Structure



4.1. Composite Floating Structure



Achievements

- ▶ A design is achieved that can meet the design requirements in terms of biomaterial and form.
- ▶ It has a capacity of 26 persons and spaces allocated for injured persons and wheelchairs or similar.
- ▶ The initial design has been modified due to the needs of the project

▶ *Conclusions drawn after the elaboration of task 4.1*

1 ▶ New opportunities

- ▶ New opportunities for the shipbuilding industry in terms of efficiency of demand for lighter and more energy efficient parts.

2 ▶ Characteristics

- ▶ The innovative material is 60% lighter than fibreglass, is easier to recycle and the resulting panels have a lower production cost.

3 ▶ Innovation

- ▶ This material has been used for the first time in a safe boat model.

4 ▶ New material

- ▶ The development of a biomaterial made from renewable sources reinforced with flax fibre has been achieved.

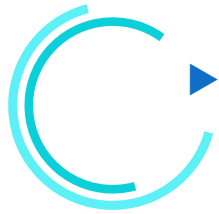
5 ▶ Properties

- ▶ The bioresin has higher elastic properties than those developed with fatty acids derived from crude oil and also the impact of gases produced in its burning at the end of the useful life of the product and much less.

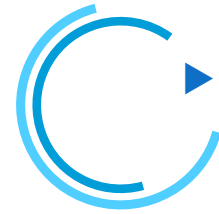
6 ▶ Consumption

- ▶ Reduction in energy consumption in the manufacturing process

4.2 MEV TYPE II part of the ship



This task concerns the feasibility analysis, design, and model testing of the MEV-II system by considering the specifications and requirements set in WP2.



Achievements

- ▶ Analysis of finite elements according to a new material and design lessonlearn in MEV-I. **This was a great challenge since there was nothing similar in the market.**
- ▶ Studies of mechanisms to separate from the ship's superstructure are like aircraft.

▶ *Conclusions drawn after the elaboration of task 4.2*

1 ▶ Capacity

- ▶ The MEVII which was designed and presented offers 50% more capacity compared to current Lifeboats, occupying the same space on deck.

2 ▶ Boarding

- ▶ A design suitable for easy boarding for all types of passengers is achieved. (Two decks).

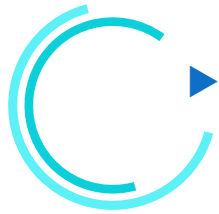
3 ▶ Launching

- ▶ The designed launching system is simple, does not depend on angles of heel, minimizes risks and takes up less space than current systems.

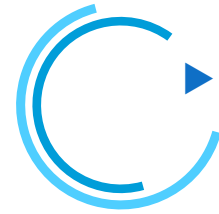
5 ▶ Stability assessment

- ▶ Hydrostatic particulars
- ▶ Weight analysis
- ▶ Loading conditions Anylisis
- ▶ Stability Calculations

4.3 Manufacturing of MEV-I



The MEV-I will be designed using as a common reference ship design, used throughout the project for all the relevant designs.



Achievements

- ▶ Manufacture of the first rescue boat made of biomaterials that meets all the objectives of the project.
- ▶ First molds according to the interior design and structural design of the MEV-I, with the uncertainty of the use of the new material, with a favorable result such as can be seen in the videos later.

▶ *Conclusions drawn after the elaboration of task 4.2*

1

▶ Productive process

- ▶ Productive study.
- ▶ Mold manufacturing.
- ▶ Part manufacturing.

2

▶ Floating

- ▶ Design and stability calculation ensure compliance with prototype design requirements.

3

▶ Shielding-free

- ▶ The use of this material avoids the shielding typical of the materials used in this area.

4

▶ Marketing

- ▶ The prototype once built was shown to both shipowners (such as Britanny Ferries) and rescue boat manufacturers. obtaining its postive assessment, although not exempt from recommendations for improvement.

5

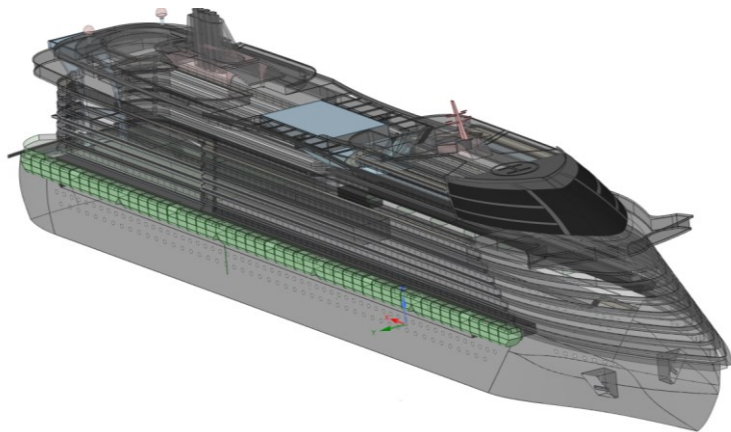
▶ Is a reality

- ▶ Rescue boat can be made from recycled biomaterials, it is shown.

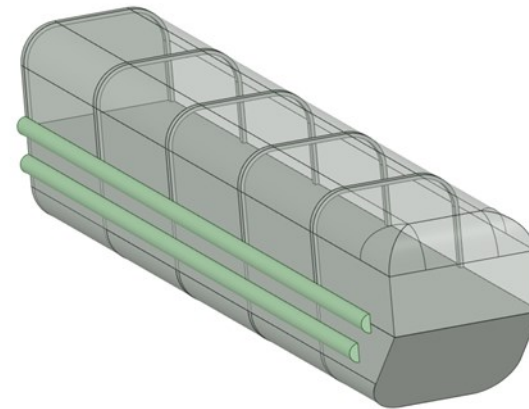
GOALS

4.4. MEV-II naval architecture and structural design

• Design and integration of MEV II on Cruise Ship



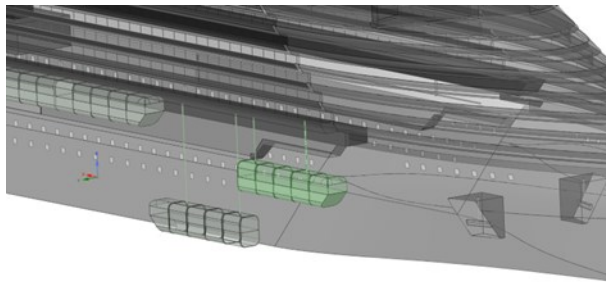
▶ Two deck design of MEV II



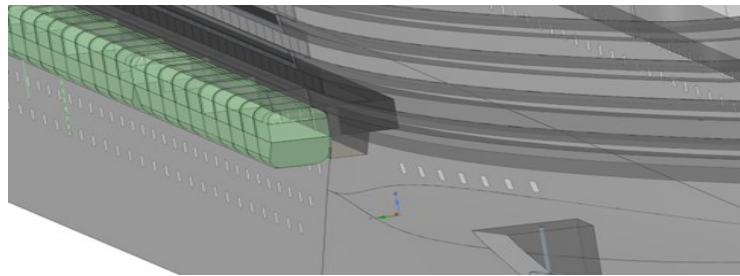
▶ Conclusions drawn after the elaboration of task 4.2

4.4-MEV-II naval architecture and structural design

1 • Ease of launching



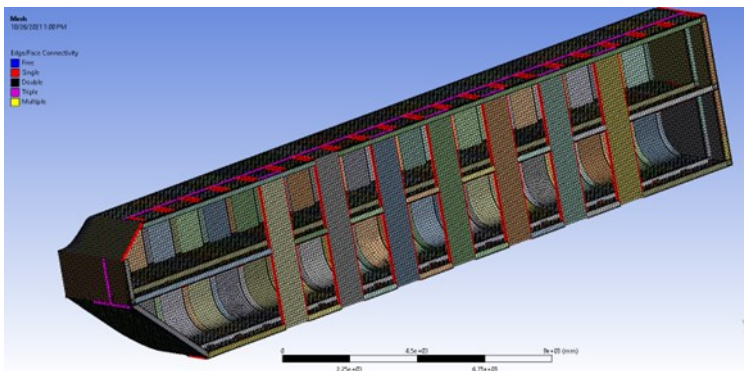
2 ▶ Safety zones



3 ▶ Accommodating

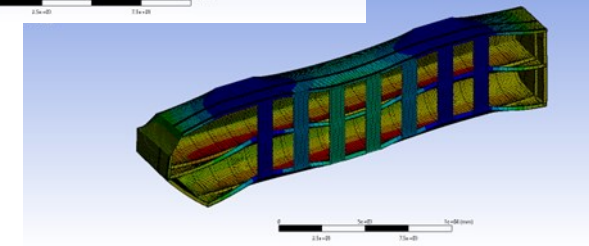
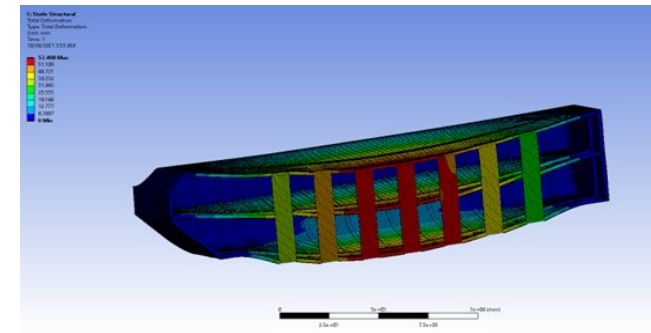
▶ Capable of accommodating more than 600 people and with 100% capacity only on one side (prto or stbd) in to decks.

4 ▶ Interior design with 2 decks

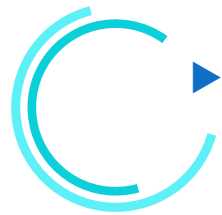


5 ▶ Structural Analysis in various boundary conditions. MEV II Hydrostatic

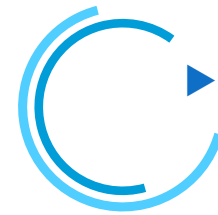
▶ MEV II satisfies relevant regulations for stability



4.5. Design of inflatable structures



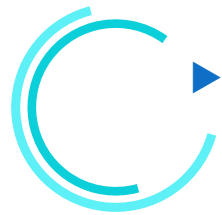
Lay-out and functioning of the inflatable structures of the MEV.



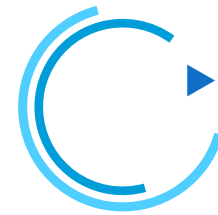
Achievements

- ▶ Inflatables provide greater stability and improve the MEV-I's sea-keeping performance.
- ▶ The inflatable assembly design was accomplished and satisfies all the requirements and specifications.

4.6. Manufacturing and integration of inflatables on MEV-I



Installation of the inflatable's structures on MEV-1. .



Achievements

- ▶ In this task the attachment of the floats to the hull of the MEV-I is achieved.
- ▶ A mooring redesign is carried out for testing under shipyard conditions.
- ▶ The new design can withstand the stresses placed on the floats and allows the floats to be uninstalled

WP4



▶ *Conclusions drawn after the elaboration of task 4.3*

1

▶ **Downscale models**

- ▶ The inflatable buoyancy elements of MEV-I Demo are downscaled models as designed for MEV-I.

2

▶ **Materials**

- ▶ The main chambers are made of coated drop stitch material.

3

▶ **future**

- ▶ The inflatables have shown that they increase stability in the sea according to the MEVI test and their integration is simple, making it easy to sell in the future.

4

▶ **Attachment points**

- ▶ The buoyancy elements are attached by means of adapter plates mounted in the MEV-I Demo base body with corresponding counterparts in the form of metal plates.

5

▶ **Inflation**

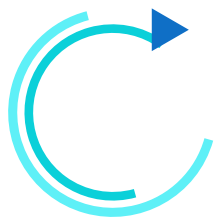
- ▶ The inflation process with quick release has been studied, the demo floats are prepared for it.

6

▶ **Security**

- ▶ the floats comply with safety measures such as pressure relief valve. All elements comply with the applicable regulations.

4.7 MEV interior 's user requirements report



MEV I defining according code solas



MEV I defining according user and partners

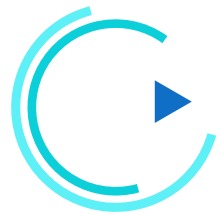
6. ITEMS SUMMARY TABLE

En verde aparecen aquellos ítems realizados ya que son ítems para el test del MEV y en rojo aquellas modificaciones para futuras versiones.

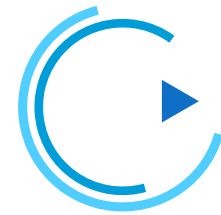
1	Ok	Ventilation - Taken into account on the interior design, real ventilation for the real demo	Code
2		Sit orientation - impossible for the real demo. Orientation will be changed in the future (feasible as well in VR model)	Code
3	Ok	Marked sitting - mark individual seats + arrows (path)	Code
4	ok	Seat belts - one for the driver as an example	Code
5	Ok	Batteries allocation and level indication/display (there is no indication) - No charging - weekly inspection + charging on demand. Mark the battery area (sticker)	Code
6	Ok	Emergency opening/exit/hatch on top (one)	Code
7		One person should be able to open the engine cover	N.A.
8	Ok	Sound proofing of the motor bay (only internal)	Code
9	Ok	Insulation of the funnel (thermal) - to put a guard	N.A.
10		Rows - Not feasible for the current MEV - Remark for the real MEV (brainstorming)	Code
11		Load line below the bottom of the door-Without and with inflatables	N.A.
12		Mooring points on platforms (catwalk)- minimum four points	N.A.
13		Hooks on top of the platform (4 hooks)	N.A.
14	Ok	IMO identification on top of the MEV (dimension, capacity)	Code
15		Risk assessment for 20% people than the capacity of the MEV	N.A.
16	Ok	List of life-saving equipment (where and how it can be stored and marked for their real storage position)	Code
17	Ok	Fire-fighting equipment + portable fire extinguisher (type, position, and number)	Code
18	Ok	Fire resistance of the materials	Code
19		More locking docks for the door	N.A.
20	Ok	Watertight rubber for the door closing	Code
21	Ok	Watertight rubber for the front window	Code
22	Ok	Safety glass for the front window - [AP] Laura to check	N.A.
23		Change the driver position - for the future; typically drivers do not sit	N.A.
24	Ok	Emergency steering + propeller guard + type of steering (propeller pod/ propeller + rudder)	Code
25		Navigation and search lights	Code
26	Ok	Radar reflector (marked)	Code
27		Portable GPS + compass	Code
28	Ok	VHF communication (VDES)	Code
29		Drone as communications realy and watch companion	N.A.
30		Rubber fender around the MEV - bigger than current one	N.A.
31	Ok	Ropes + grab lines all around the MEV	Code
32		Whippers and spray (front window)	N.A.
33		Inclination of the top of the MEV	N.A.
34		Internal lightning (artificial) - addressed in the interior design	Code
35	Ok	Spot to treat wounded/injured people	Code
36		Hygiene (e.g., toilets)	N.A.
37	Ok	Drinkable water + food - space allocation	Code
38	Ok	Fuel tank (capacity, type of fuel)	Code
39	Ok	Space/storage for wheelchairs	N.A.
40		Quick release of the hooks from inside the MEV - impossible for the (real) demo	N.A.
41	Ok	Inflatable attachment	N.A.



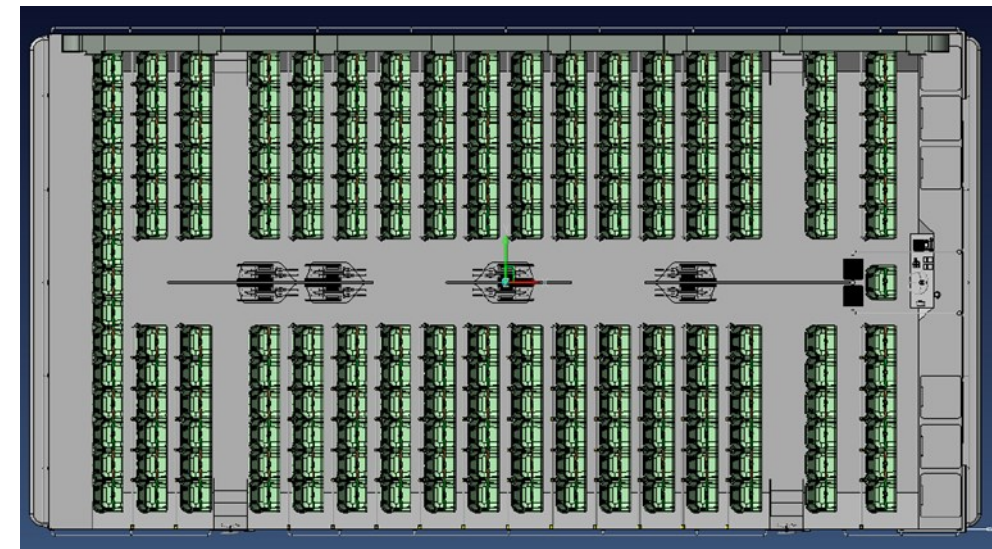
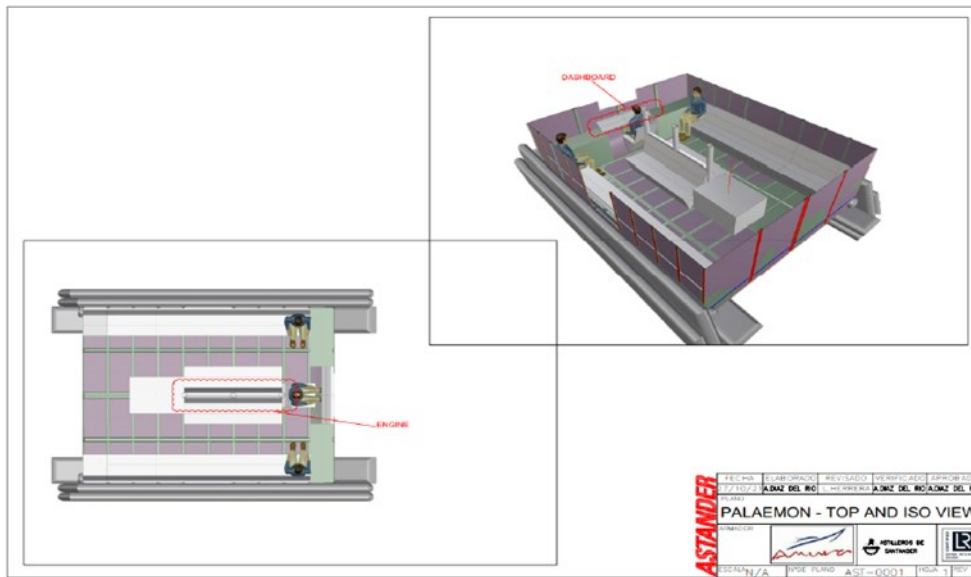
4.8/T4.9 MEV interior 's detailed design



MEV I demo interior design



MEV II demo interior design



▶ *Conclusions drawn after the elaboration of task 4.4*

1

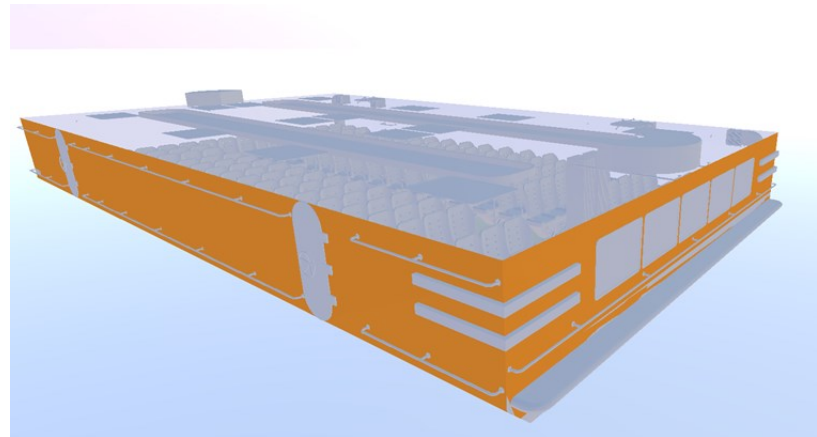
- ▶ Designed based on Life Boats according Hellenic Spirit Ship's



2

▶ Interior

- ▶ Accommodating 210 people which is an increase of 36% more persons than traditional Life Boats



3

▶ future

- ▶ In ferry vessels it is possible to integrate new design development with more people and areas more comfortable

6

▶ safety

- ▶ Equipment present in the MEV II for first aid and safety





In summary, the achievements of Work Package 4 are stated as follows:

Firstly, the design concept MEV-II and manufacturing of a prototype of the MEV-I

Secondly, It is presented to different agents in a pre-commercial way within the value chain of the prototype.

Third, both the requirements and recommendations of the user, DNV and SOLAS are complied with is.



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Thank you

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