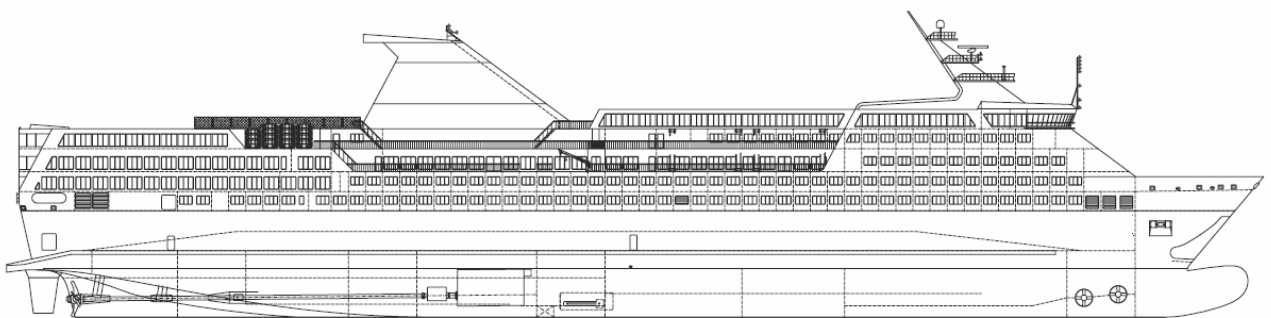


**Studio di Ingegneria Navale e Meccanica**

**RO-RO/PAX**

**CLASS**

**MEGA EXPRESS**



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## ***Fast conventional vessels***

The “need for speed” in marine transportation of passengers, coupled with the troubles experienced by each operator of HSC first generations, has led to the design of conventional Ro-Ro/Pax capable of transporting a large number of passengers at a considerable speed and in maximum comfort.

The Mediterranean Sea, as it has always been the case, has been the first basin to define the main parameters of such kind of Ro-Ro/Pax, capable of speeds of about 30 knots; today its routes are sailed by an increasing number of high speed Ro-Ro/Pax

Among the fleets equipped with such kind of vessels are:

- Corsica & Sardinia Ferries;
- Grandi Navi Veloci – Grimaldi;
- Minoan;
- Moby;
- Super Fast – Panagopulos;
- Tirrenia.

It is worth noting that, while the first batch of high speed Ro-Ro/Pax had speeds of about 25 knots, the current trend has set for maximum speeds around 30 knots.

Together with the commercial strive for higher speeds, Ro-Ro/Pax have witnessed the coming into force of new regulations concerning safety and stability and, above all, of the Stockholm Agreement, the new regulation concerning the stability in damage conditions, adopted for political / emotional reasons after M/V Estonia tragedy.

The project of Ro-Ro/Pax Class Mega Express starts exactly in the moment in which both 25 knots are no longer considered sufficient for a Ro-Ro/Pax and the Stockholm Agreement came into force.

Corsica & Sardinia Ferries, having acquired a Delta Marin project for a fast conventional vessel, needed therefore to update such project to the new scenario.

SINM accepted the challenge from Corsica & Sardinia Ferries, radically updating the original project of Ro-Ro/Pax Class Mega Express: among the first fast conventional Ro-Ro/Pax of the second generation, fully optimized and sharply focused on the client’s commercial needs.

### ***Main characteristics of Ro-Ro/Pax Class Mega Express***

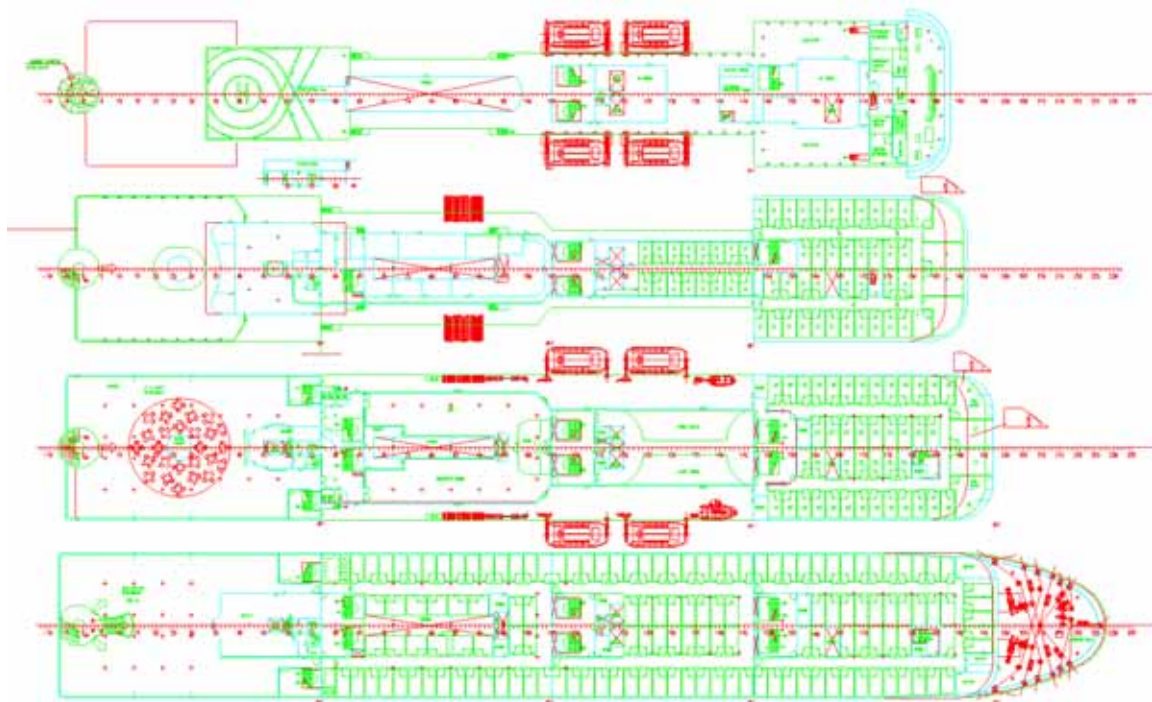


Length over all	176.38	m
Length between the perpendiculars	159.7	m
Breadth	24.8	m
Draft, fully laden	6.45	m
Height of bridge from the base line	26.45	m
Displacement	15600	t
Gross tonnage	23700	t
Propulsive power	46.8	MW
Cruise speed @ 80% MCR	> 28	kn
Maximum speed	> 30	kn
Passengers	1756	-
Passengers' cabins	298	-
Air seats	300	-
Cars (no trailers)	550	-
Lane meters for trailers	900	m

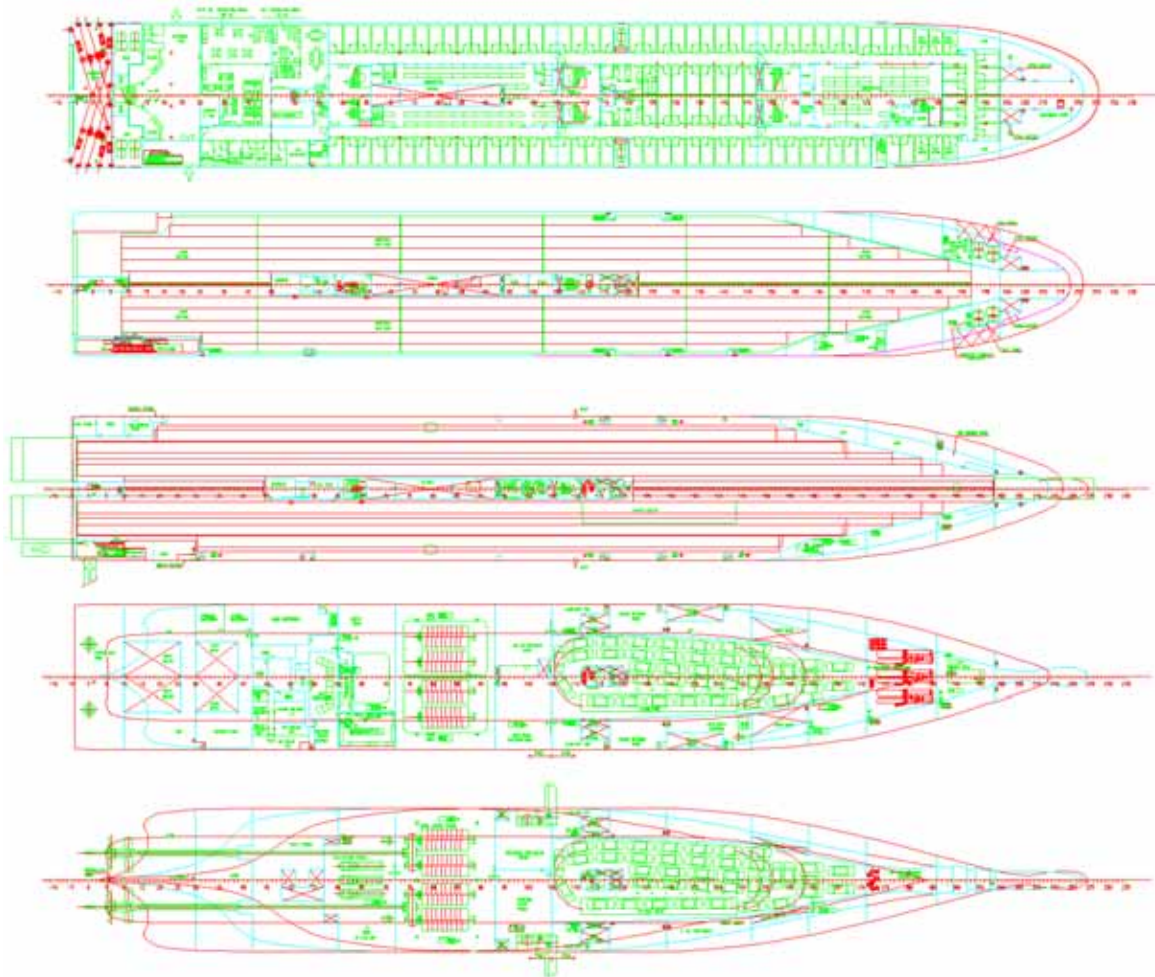
***General arrangement plans of Ro-Ro/Pax Class Mega Express***



**Ship profile**



**Decks 6 – 9**



**Decks 1 - 5**

***Pictures of Ro-Ro/Pax Class Mega Express***



## ***Optimization of Ro-Ro/Pax Class Mega Express***

The goals of SINM intervention on the original Delta Marin project have been twofold: to obtain a vessel compatible with the new normative and commercial scenario and to fully optimize the ship.

In respect to what above SINM's main achievements have been the following:

### **Stockholm Agreement Compliance**

Stockholm Agreement compliance has been achieved mainly by increasing the ship breadth from 24.5 to 24.8 meters.

### **Optimization of hull and appendixes in respect to efficiency**

The bow and the stern geometry have been radically modified in respect to the original design and then optimized at Hamburg Ship Model Basin, HSVA, in particular a "goose neck" bulb, a "duck tail" stern and a trim wedge have been adopted, the arrangement of the rudders have been optimized. These modifications have granted a remarkable increase in the hull hydrodynamic efficiency in respect to the original design, already optimized; it is worth mentioning that, in respect of non optimized projects, the efficiency increase due to the adoption of a "goose neck" and of a trim wedge can be estimated in about 7% and 13% respectively. The trim wedge has also remarkably reduced the "anomalous waves" phenomenon which, in the past, has created some problems in connection with high waves hitting the beaches.

### **Optimization of hull in respect to seakeeping**

The optimization of the ships response in heavy sea, seakeeping, has been talked preliminarily by calculation and later sharpened via tank tests. Thanks to the modifications of to the bow flare the vessels are almost insensible to the sea state and the green water effect has been eliminated, the seakeeping response of the vessels is optimum. In this respect it is worth mentioning the Mitsubishi fins stabilizers, extremely performant in dampening the roll motion of the vessel and of very low resistance.

### **Amelioration of the manoeuvring performances**

The manoeuvring performances of a Ro-Ro ship is extremely important, as important as the propulsion efficiency while under way, this is even more so in respect of fast vessels, which have to perform very precise manoeuvres in very little time. In order to guarantee optimum manoeuvring performances in confined waters and restricted time, the bow thruster power of the Ro-Ro/Pax Class Mega Express has been dramatically increased. In order to minimize the installed power, the bow thrusters are driven by the main engines, via shaft generators. Also the maximum rudder angle has been increased. It is to be noted that the rudders are of BOT type,

rudders equipped with flap were discarded since their over steering is a penalty while under way.

### **Weight reduction**

A strict weight reduction policy has been enforced both in the design and in the construction phase, also the choice of given components, most noticeably of the car decks, has taken into account the weight as a critical factor. What above has resulted in an 800 tons decrease in ship weight, in respect of the original project, even though the thickness of a large extent of the hull plating has been increased of more than 50% in respect to the original project.

### **Optimization of plants**

The choice of the plants has focused on the maximization of the availability, reliability and efficiency. Great care has been taken in the choice of the propulsion components, extremely critical due to the very high power. In this respect the Renk designed gearbox has been revised, adopting a double helix teething instead of a single helix one and introducing the lubrication of the teething disengagement. In order to extend the MTBO and life of the machines the fuel and lubricating oil system have been equipped with state of the art Filtrex automatic self cleaning filters, having mesh of 25 and 15  $\mu\text{m}$  respectively. The pumps, supplied by Pompe Garbarino, have been modified in order to make them even more long lasting and trouble free. The choice of the plants and of the suppliers, based on strict engineering criteria, has given very positive results. It will never be stressed enough that the savings to be obtained in the ship life cycle by making such choices are great and that their impact on the new building cost is very limited.



## ***The future***

Notwithstanding the “institutionalization” of the “motorways of the sea” concept, both at national and at EU level, the development of commerce and transportation will have a strong impact on the shipping, which is the most economic and environmentally friendly mean of transportation. In this respect it has to be remembered that the shipping transportation of a TEU for a mile requires about a teaspoonful of fuel.

What above will have strong repercussions on short sea shipping, both for passengers and goods and will require a global rejuvenation of the present fleet, old, slow, inefficient and only marginally profitable.

Despite the close correlation between ship and route, required by short sea shipping, it is easy to foresee that the next generation of Ro-Ro will have the following service speed:

- Up to 25 knots, Ro-Ro;
- Around 30 knots, Ro-Ro/Pax.

SINM has further expanded the concept applied on Ro-Ro/Pax Class Mega Express, developing basic designs of fast conventional Ro-Ro and Ro-Ro/Pax vessels of third generation: more profitable, efficient and reliable, capable of moving a large quantity of passengers and goods at high speed even in severe environmental conditions.

SINM offers his knowledge and expertise to all the concerned parties, underlying that the engineering soundness of a vessel is one of the key factors for its commercial success.

Please contact us for further details

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