

RoPax Evolution

How market demand and infrastructure constraints have driven the design of Mediterranean-based ferries

BY COSTIS STAMBOULELIS



RoPax ferry *Superfast 1* was designed with an emphasis on increased cargo capacity, having a total of 2,600 lane meters. Photo by George Giannakis.



esigning a RoPax ferry for service in the Mediterranean Sea generally is a very challenging project, having to satisfy a large number of often-contradictory requirements and to observe constraints imposed by international and national rules of the flag state. Ferries operating in the region must comply with Safety of Life at Sea (SOLAS), the International Convention for the Prevention of Pollution from Ships, and European Directive 98/18 in terms of safety and environmental protection.

Some national administrations have additional safety rules and other standards concerning a many varied issues ranging from minimum requirements for the comfort of passengers, to requirements for the access and accommodation of handicapped persons, to the transportation of pet animals and hygienic matters in general. The constraints imposed on any particular ferry design are closely connected to the type of service in which a vessel will be employed; the period of the year (summer/winter) during which this service has to be performed; and the characteristics (even peculiarities) of the ports at which a vessel will have to call.

In broad terms, RoPax ferries operating in the Mediterranean can be classed in one of the following categories:

- 1: ferries employed between two or three major ports, either of the same country or of two different countries
- 2: ferries employed between one major port on the mainland and several smaller (usually island) ports
- 3: ferries connecting several island ports.

In category 1, for example, the services run between:

- Patras (Greece) – Igoumenitsa (Greece) – Ancona (Italy)
- Piraeus (Greece) – Heraklion (Greece)
- Civitavecchia (Italy) – Barcelona (Spain)
- Genova (Italy) – Palermo (Italy)
- Marseille (France) – Porto Torres (Italy)
- Marseille (France) – Algiers (Algeria)
- Genova (Italy) – Palermo (Italy) – Valletta (MAL)

In category 2, the services run between:

- Piraeus – Paros – Naxos – Santorini
- Piraeus – Patmos – Kalymnos – Kos – Rodos
- Piraeus – Chios – Mytilene
- Naples – Isole Eolie
- Naples – Capri.

In category 3, the services run between:

- Syros – Paros – Naxos – Ios – Sikinos – Folegandros – Anafi

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- Rodos – Chalki – Kos – Kalymnos – Leros – Patmos
- Rodos – Symi – Tilos – Nisiros
- Syros – Serifos – Sifnos – Folegandros – Ios – Naxos
- Naxos – Heraklia – Schninoussa – Koufonisi – Amorgos.

As in most parts of the world, safety is the primary consideration in the design of a Mediterranean RoPax ferry in each of these categories, and in this respect, SOLAS rules are followed by all Mediterranean countries plus any additional national rules the flag state might have. Revisions of existing rules or additions of new rules are usually made following relevant proposals by the International Maritime Organization (IMO) member states, which already have similar provisions in their own national rules.

It is worth mentioning that there were cases in which national (Greek) rules were in force for many years before they were included in SOLAS. The securing and monitoring of shell doors was a requirement of the Greek Administration as of 1967, following the sinking of the converted passenger/cargo liner *Heraklion* at the end of 1966. However, it was added to SOLAS only after the sinking of the *Estonia* some 28 years later.

SOLAS rules are revised frequently and new rules are often added in rapid succession, following extensive discussion and debate in the IMO Maritime Safety Committee.

It is unfortunate that proposals for new rules are all too often triggered by serious accidents at sea with attendant loss

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of life. Some of these proposals are so extreme and outrageous that they are rejected by the relevant IMO committees, but others have been adopted in spite of being, in some cases, unjustifiably strict.

Such new rules include, among others, the extension of collision bulkheads to weather decks; the Stockholm Agreement for water on deck; the probabilistic method of stability calculations; leakage monitoring and alarm in all shell openings; smoke detectors in corridors; dead end corridors; low-level lighting; helicopter landing areas; and recently, safe return to port.

New rules have an immediate effect on the design of new RoPax ferries, resulting in more complex and expensive construction, which owners and operators are made aware of when negotiating newbuildings. It can be more difficult to carry out the modifications necessary to comply with new rules requirements

on existing vessels, which has been a common occurrence in the Mediterranean during the last 25-30 years.

In the past, Mediterranean operators—mostly Greeks—have shown a preference for purchasing second-hand vessels and converting them rather than ordering tailor-made newbuildings. The extent and kind of conversions were dictated primarily by the need to fulfill all the latest safety rules and by the specific trade requirements of the operator.

Japan has traditionally been a major source of second-hand ferries; presently, more than 40 ex-Japanese RoPax ferries are plying Mediterranean waters. However, it should be noted that upgrading these vessels to fulfill then current rules often required major conversions.

Today, existing vessel compliance with the new rules is problematic in many ways, as it may lead to a reduction in deadweight, garage capacity, number of passengers, or all of these together. In the end, it may not make commercial sense.

RoPax market development

In the early post-WWII years, when the devastation in Europe included severe damage to many Mediterranean ports and an almost total lack of any public road network, sea traffic was confined to the transportation of passengers only by a variety of old vessels. These included small passenger ships, small freighters, and caiques that had survived the war.

There were very few roads, limited commercial and industrial activity, very few private cars to be transported by sea between major ports, and practically no trucks or trailers. In those years, the RoPax ferry in the Mediterranean as we know it today simply did not exist.

The reconstruction that in Eastern Mediterranean countries was much slower than in the rest of Europe and increasing commercial activity brought about the appearance of the first passenger car ferries in the late 1950s-early 1960s. These were converted passenger liners with limited capacity for private cars and rudimentary access equipment.

The first-purpose built RoPax ferries were introduced in the Mediterranean by Italian and Greek operators in the early 1960s. They were heralded as state-of-the-art ships and, in spite of being rather small vessels with small passenger capacity and even smaller car capacity in their garages, they were employed in short international routes between Greece and Italy. A few years later, the first RoPax vessel was introduced also between Italy (mainland) and Sardegna.

Contrary to the development of RoPax designs in Northern Europe, the increasing demand for truck and car capacity in the Mediterranean during the 1960s was met at first by extensive conversions of older passenger and cargo liners and even tankers, which continued well into the 1970s. Such conversions consisted of providing adequate accommodation and redesigning cargo holds of cargo liners and tankers into garages with access by simple ramps at the sides of the vessels.

The stern arrangement of *Superfast VI* is typical for a modern Mediterranean RoPax. The narrow ramp of the port side is for passenger embarkation. Photo by Odysseas Xeriziotis.



In those days, rules concerning the construction of shell doors (their securing, monitoring, and surveillance), the construction and testing of lashing points, and stowage plans had not been drafted yet at the international level. National authorities had first to address all pertinent issues on the presentation of conversion drawings and prepare a regulatory framework.

During the 1970s and '80s, economic growth and overall prosperity in Europe was reflected in all modes of transportation including transportation by sea and the RoPax ferry in particular. The demand for more frequent connections between major ports; more space for cargo units (which in those years were almost exclusively self-driven Transport International Routiere trucks); and more passenger accommodation for people who wanted to travel for pleasure all had a significant impact on the ferry industry.

New companies were formed; more ships were purchased and converted to suit particular routes; and more new ferries were designed and built incorporating the latest developments in materials, equipment, and machinery. During the last 50 years, some Mediterranean RoPax companies have gone out of business, some have changed ownership (including the state) more than once, while others have been rebranded under a new ownership and started a fresh career.

Table 1 lists major Mediterranean RoPax ferry companies indicating the year in which they first started operating RoPax ferries under their present brand name.

In competing against the alternative land route, the time of crossing between major destination ports in the Mediterranean was a considerable handicap for RoPax ferries in the 1970s and

TABLE 1: MAJOR MEDITERRANEAN ROPAX COMPANIES

COMPANY NAME	YEAR OPERATIONS BEGAN
Acciona Trasmediterranea (Spain)	2002
Algerie Ferries (Algeria)	1987
Anek Lines (Greece)	1970
Balearia (Spain)	1998
Blue Star Ferries (Greece)	2000
Caronte (Italy)	2001
CMN (France)	1988
Corsica Ferries (Italy)	1968
Cotunav (Tunisia)	1978
Grandi Navi Veloci (Italy)	1993
Grimaldi Lines (Italy)	1999
Hellenic Seaways (Greece)	1999
Minoan Lines (Greece)	1974
Moby Lines (Italy)	1992
SNCM Ferryterranee (France)	1976
Superfast Ferries (Greece)	1995
Tirrenia (Italy)	1963

Blue Star Delos, one of the newest RoPax ferries operating in the Mediterranean, arrives at dawn in the Port of Piraeus. Photo by Christina Grigora.



'80s. Traveling at service speeds of 18-19 knots, they needed 31-32 hours to reach Ancona (Italy) from Patras (Greece)—a length of time that was not very appealing to trucking companies.

Greater speed, reduced time

This handicap was eliminated in the mid 1990s with the introduction of RoPax ferries having a service speed of 25 knots. The new Greek company Superfast Ferries was a pioneer in the design and operation of the first Mediterranean fast RoPax ferries, which reduced the time of the Patras to Ancona crossing down to 20-21 hours. Other Mediterranean companies, both Greek and Italian, followed suit in designing and building new RoPax ferries with service speeds up to 30 knots.

Those were the days of the increased demand for the transportation of goods and of the low cost of fuel. The shorter crossing time, combined with competitive fares and the comfort and amenities offered onboard these modern vessels, attracted more tour operators, individual passengers with their cars, and trucking companies. It also increased the demand for more capacity.

Throughout the Mediterranean, this created turmoil in all headquarters whether in Greece, Italy, Spain, or France—soon to be followed by some North African countries. Even where the high speed was not actually needed, operators saw that the spacious and well-designed accommodation spaces and quality service

onboard modern RoPax ferries were key elements of a successful and profitable operation.

The speed of the vessels notwithstanding, Mediterranean RoPaxes grew increasingly larger, due not only to newbuildings but also to acquisitions from the second hand market.

At the end of 2012, there were:

- 31 vessels built between 2006 and 2012 with an average length of 170.0 m
- 43 vessels built between 2001 and 2005 with an average length of 175.1 m

In contrast, in the year 2000 there were

- 25 vessels built between 1996 and 2000 with an average length of 158.0 m
- 20 vessels built between 1991 and 1995 with an average length of 142.5 m
- 23 vessels built between 1986 and 1990 with an average length of 109.7 m.

At the end of the 1990s, the Mediterranean market reached peak levels—at least in the eastern region because of the war in Yugoslavia and the consequent interruption of transportation by road from Balkan countries, Turkey, and Greece to Western Europe.

There was a quantum leap in the development of the Mediterranean market between the early 1990s and the beginning



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Access equipment plays a key role in a safe and efficient RoPax operation, and its design depends a great deal on port facilities and infrastructure.

The development of RoPax ferry design, and the high standard of services offered by ferry companies in their regular connections of major ports, helped establish the sea route as a viable alternative to the land route—even when all the highways of Europe were open and fully operative.

European central government officials saw the sea route also as an alternative method of transportation that would be good for the environment, as it could potentially attract more trucks and trailers and reduce the load on motorways. “Motorways of the Sea” is the incentive plan developed in Brussels to attract operators to open new routes and carry more cargo by sea.

At the turn of the century, the forecasts were quite optimistic for all categories of RoPax operation. All operators in the Mediterranean region continued investing in new vessels—smaller or larger according to the routes they intended to serve.

The pattern in the market regarding the three major categories of ferries has been very consistent throughout the years. As the ferries for the longer routes increased in size, so did the ferries connecting major ports with islands. The same occurred with ferries operating between the islands, at least as much as other physical constraints would permit them to do.

As the end of the first decade of this century approached, the clouds of recession appeared. The market began to show signs of stagnation and then shrinkage. To make things worse, the price of fuel escalated to unprecedented high levels. Political unrest in North African countries also has played a part. Taken together, all of these factors have created a very bad mixture with which Mediterranean ferry operators have to contend.

The vessels and the ports

It could reasonably be said that Mediterranean RoPax ferries belong to a special breed of this type of vessel due to their adaptability to a wide variety of port sizes, port facilities, and infrastructure. When one observes a RoPax ferry built for the North Sea or the Baltic, and another built for the Mediterranean, he or she will not fail to identify significant differences in their access equipment, whether for passengers or for cars.

of the new century. The number of vessels employed was increased by approximately 63%, lane meter capacity by approximately 161%, and passenger capacity by approximately 77%.

During the first decade of the century, there was some consolidation in terms of available number of vessels and passenger capacity, but not so in the lane meter capacity category. This has shown continued growth, though at a reduced rate.

Such growth in lane meter capacity is worth noting when considering that, during the same period of time, the Mediterranean market has sustained the operation of a large number of pure RoRo vessels with large trailer capacities, often in straight competition with the RoPax ferries on the same routes.

Varying design

Certainly, Mediterranean RoPax ferry companies have not always shared the same ideas about various design aspects, but they all have managed to renew their fleets with highly notable vessels. Optimum arrangement of garage decks and means of access for cars and trucks have been considerations for all operators. However, it has not been so in accommodation and interior layout, in which some operators have paid more attention than others. Very good ships as they all are, some Mediterranean RoPaxes display a minimalist approach in their interiors, while others should reasonably be classified as cruise RoPax ferries.

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Access equipment plays a key role in a safe and efficient RoPax operation, and its design depends a great deal on port facilities and infrastructure. When it comes to the Mediterranean, these can vary considerably between ports, and they usually are inadequate.

Contrary to RoPax ferries operating in ports of the North Sea or the Baltic, where appropriate link spans are provided in ferry berths to suit the access means of the vessels (which in some cases do not even have ramps of their own), RoPax ferries designed for the Mediterranean must be equipped with highly versatile ramp installations to cope with whatever is available on the shore side. In addition, they also must have large ballast pumps to quickly change the draft at the stern to suit the height of the quay.

This unsatisfactory situation is certainly not the case in the major Mediterranean ports. But it remains unchanged in a large number of island ports where little work has been done since the time that RoPax ferries replaced simple passenger ships.

The drive through concept—loading from the stern at the starting port and unloading from the bow at the port

of destination—also is something one will rarely see in the Mediterranean.

With perhaps just a few exceptions, RoPax ferries berth with the stern in Mediterranean ports, in which case maneuvering of the trucks and cars once inside the vessel becomes mandatory to ensure fast unloading in the port of destination. This exercise becomes even more complicated when the ship has to call in two or more ports.

In main ports such as Piraeus, Patras, Genova, or Ancona, there are corner berths of sufficient size where large RoPax ferries can be safely moored alongside and load from the stern. However, in most other cases, including in the main ports, vessels must use their anchors too. In smaller, exposed ports, they even have to keep their propellers turning to maintain their position during loading.

Another feature of modern RoPax design that does not apply in the Mediterranean is the arrangement for simultaneous loading on two different decks. Large RoPax ferries may have the required doors and gates on their upper decks, but if ports lack the appropriate link spans, such features are a waste.

The ports' condition is reflected also in the means of passenger embarkation. In the North Sea and the Baltic, the circulation of people in and out of the vessel takes place away from the vehicle ramps, directly from a terminal building to the vessel at the level of the reception lounge through movable pedestrian gangways with adjustable height to suit different vessels. In contrast, in the Mediterranean it is done either through passenger ramps alongside the vehicle ramps or through the vehicle ramps themselves. This is why many RoPax ferries in the Mediterranean are

As a result of the condition of many ports, RoPax ferries have limitations in their main dimensions, which designers cannot exceed.

With the three ramps at differing stages of opening, *Blue Star Delos* performs an astern maneuver as she approaches the berth. Photo by Christina Grigora.



provided with long escalators starting close to the stern and ending three or four decks above.

As in all parts of the world, passenger traffic is highly seasonal in the Mediterranean, where the number of passengers in July and August exceeds the total of the remaining ten months of the year.

As opposed to Northern Europe, traveling on an open deck during summer in the Mediterranean is very common and popular, especially among younger people. Therefore, RoPax ferries in the Mediterranean, almost without exception, offer ample open deck space for passengers.

Of course, this space is not a simple open deck as the term implies, but rather a space where passengers are sufficiently protected from the sun, the rain, and the wind by a combination of windscreens and awnings. The design and construction of such open passenger decks, ranging from the very simple to the very sophisticated, are governed by specific rules made usually by the flag state.

In the late 1990s, Mediterranean RoPax operators had to consider the growing demand by passengers traveling with their campers to holiday destinations, to actually camp onboard the vessels during crossing. National authorities of the countries involved had to consider the implications and prepared special rules to govern this kind of transportation, which is allowed only during the summer months.

It is evident that the evolution of RoPax design has been much faster than that of Mediterranean ports. One explanation for such phase difference is that the former is private while the latter is public—and in the Mediterranean, public means slow.

The ships have grown in size and complexity, but with the exception of the main ports—which have expanded and improved their facilities to be able to accommodate the larger vessels and the bigger volumes of passengers and trucks/cars—other ports have seen little change. This is due not only to bureaucratic slowness and civil service indecision, but in some cases also due to the strong opposition of local communities for a variety of reasons.

As a result of the condition of many ports, RoPax ferries have limitations in their main dimensions, which designers cannot exceed. Of primary importance is to be aware of the exposure of the port, and the size of the basin in which turning and berthing maneuvers will have to be carried out. These factors will drive inclusion in the design of high maneuverability, efficient anchoring and mooring capacity, and the quick response of propulsive installation to bridge commands, all of which are essential to ensuring a safe operation.

The environmental issue

Although decisions have been made about the introduction of the sulphur emissions control area in the whole of Europe, it is still not clear how RoPax ferry operators in the Mediterranean will deal with it. The introduction is not so imminent as it appears presently to be in the Baltic, but the same issues that are causing



Blue Star Patmos with all stern ramps down, safely berthed in the Port of Piraeus. Photo by Christina Grigora.

considerable anxiety to Baltic operators will have to be faced by Mediterranean operators sooner than they would wish.

At this time, there is a lot of talk about liquefied natural gas (LNG) as an alternative fuel, and we already have the first large Baltic RoPax using LNG in operation. However, further development is needed on this pioneering vessel, and this won't be fast or easy. The design of RoPax ferries will have to change considerably, but when it comes to the Mediterranean, the major issue will be the network of refueling stations and not the vessels.

Currently, there is no LNG refueling facility in any Mediterranean port, and the use of refueling tankers is not a realistic solution if they have to travel long distances to reach major RoPax ports in the Western and Eastern Mediterranean.

Port authorities are aware of the probability that LNG-fueled RoPaxes will call at their ports, but they appear very reluctant to invest in preparing the necessary storage and bunkering facilities. As one official put it recently, "Let them first come and when we are asked we shall provide the necessary facilities." [For more on this topic, see "The LNG Option," beginning on page 38 in this issue.]

Future consolidation

Since 2009, Mediterranean RoPax operators have been battling to control operating costs and contain losses. Some vessels have been rerouted or have reduced their speeds, others have been laid up, and a few of them have been sold to operators outside of the Mediterranean.

Until the economy recovers, there will have to be further consolidation in the Mediterranean market. It is to be hoped that the high standards of modern Mediterranean RoPaxes and the quality of service they offer will be maintained. **MT**

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