

# INGEMAR

*Ingegneria Marittima*



**Pontoons and constructions on the water**

# INGEMAR

Since 1979 Ingemar has been building floating structures for marinas and special applications in the industrial, transport and leisure sectors.

It has its registered office in Milan, while the administration, production, technical and sales offices are concentrated in the plant in Casale sul Sile (TV) some 20 km from Venice.

The company independently covers all operational phases: design, construction, installation, maintenance and after-sales services.

The group fulfils the needs of public administrations, private companies and boat clubs creating new berths and providing the necessary supporting services. In the course of its activity, it collaborated with important Italian industries, patenting some innovative solutions in the nautical field.

Production includes a wide range of pontoons and floating platforms, wave attenuators, fixed piers and service terminals.

The company's involvement ranges from the simple supply of equipment to the turnkey construction of modern floating marinas in case of larger and more complex projects.

The Group has in-house expertise to solve all technical design issues.

The production and assembly of the most important components takes place at the Casale sul Sile plant; for special requirements Ingemar makes use of established suppliers and collaborates with selected partners.

In recent years there has been a growing demand for large floating structures to meet the needs of mega yachts and for larger and larger floating breakwaters.

To overcome the difficulties and costs of transport, Ingemar established numerous licensing agreements for construction abroad, while for closer destinations it developed the technique of directly operating mobile construction sites. Ingemar is a leader in the sector in Italy and in the Mediterranean and it is present in several Middle Eastern countries.



*Porto Turistico di Loano, Savona - Italy*



*Sea City Marina - Kuwait*



*Dubai Harbour - United Arab Emirates*



*Marina Jasmine, Hammamet - Tunisia*



Lefkas Marina - Greece

The role of Ingemar is that of “highly qualified technical partner and reliable supplier” to:

• **Public Authorities and Private Enterprises:**

- Feasibility studies, reorganisation and extension of existing marinas.
- Design and supply turnkey projects for moorings, fittings, equipment and services for tourist harbours.
- Pontoons and floating platforms for the pleasure industry and internal water transport.



Marina di Castellammare di Stabia, Napoli - Italy

• **Yacht Clubs and Sports Associations:**

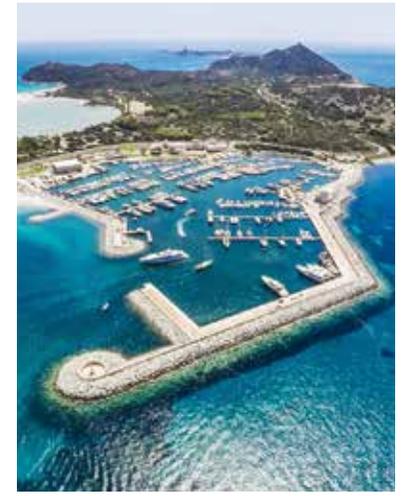
- Upgrade of equipment and services, expansion of receptive capacity.
- Supply of fixed and floating structures for moorings and sporting event equipment.

• **Industry and Services**

- Design and construction of floating structures for specific industrial requirements.
- Assessment floating alternatives in place of traditional structures.



Marina Novigrad - Croatia



Marina di Villasimius, Cagliari - Italy



Marina Cala Balbiano, La Maddalena - Italy

## NAUTICAL EQUIPMENT

Ingemar specialises in the construction and installation of equipment and services which ensure the highest operational standards for marinas. Production covers a wide range of assembly products to meet the specific requirements of installations and is divided into the following types:

- Floating pontoons
- Fingers and mini-fingers
- Floating piers
- Fixed piers and quays
- Floating wave attenuators
- Harbour services



*Marina del Gargano, Manfredonia - Italy*



*Ayla Marina, Aqaba - Jordan*



*Marina Molo Pagliari, La Spezia - Italy*



*Porto Vecchio Marine, Sant'Amanza - France*



*Porto Regionale di Locarno - Switzerland*



*Porto Montenegro, Tivat - Montenegro*



*Marina Valletta - Malta*



*FE type continuous pontoon*



*FE type discontinuous pontoon*



*AL type discontinuous pontoon*



*FE/PE discontinuous pontoon*



*CA/CLS type pontoon with embedded service side channel*



*CA/CLS type pontoon with cast-in service ducts*



*CA/LE type pontoon*



*CA/LE type pontoon with granite side finish*

## FLOATING PONTOONS

Floating pontoons are now standard both in modern marinas and in revamped harbours, thanks to their adaptability, durability and practicality.

Relative indifference to water depth, speed of construction, possibility of adding structures to the floating system in stages and at a modest expense, have all contributed to the rapid expansion of these structures as a replacement of traditional fixed pontoons.

### Discontinuous pontoons:

**FE-type pontoons**, with a galvanised steel structure, timber decking and floating units made of concrete with expanded polystyrene core are characterised by high stability and adaptability to the specific requirements of freeboard, live load and structural strength.

**AL-type pontoons**, with an aluminium alloy frame that, in well-protected basins, ensure maximum flexibility and functionality with aesthetically pleasing characteristics.

For both FE and AL pontoon types, PE versions with floating units made of rotomoulded polyethylene are available in standard supply. They are particularly suitable for seasonal or shallow water installations.

Standard production includes modules with lengths of 12 and 8m and width of 1.6, 2.0, 2.5 and 3.0m. Bespoke elements with the same structural and finishing characteristics can be designed and produced to satisfy specific project requirements.

### Continuous pontoons:

**CA/CLS type pontoons**, all-concrete, made of monolithic reinforced concrete elements with a polystyrene core and a concrete walking surface, characterised by very high displacement and maximum stability in water; which makes them fully comparable to traditional fixed structures.

**CA/LE type pontoons**, similar to the previous ones but with high quality finish granted by the addition of a timber decking.

Standard production includes modules with length of 12 and 8m and width of 2.0, 2.5 and 3.0m.

Bespoke elements with the same structural and finishing characteristics can be designed and produced to satisfy specific project requirements.

## FINGER AND MINI-FINGER

Mooring with fingers, which (necessary where tides are significant) is increasingly appreciated for facilitating access to vessels and simplifying mooring manoeuvres. In addition, fingers allow better use of the available port space and ensure greater stability of the pontoons. As far as the management of berths is concerned, mooring with fingers benefits from maximum flexibility, since they can be easily relocated to adapt to the changing size of the vessels. It also eliminates the onerous maintenance of underwater moorings.

Usually, the types of fingers used are the same as the pontoons to which they are to be connected, therefore with steel or aluminium structures and concrete or polyethylene floats for installations with FE or AL pontoons. On CA/CLS pontoons, two alternative types of fingers are possible: discontinuous floating fingers as for the previous two types of pontoons with metal frames, or the adoption of monolithic reinforced concrete structures of the same characteristics as the pontoons. Production includes modules with length of 6.0, 7.5, 9.0, 10.5, 12.0 and 13.5m.



*Marina Certosa, Marina Sant'Elena e Diporto Velico, Venezia - Italy*



*Porto Piccolo, Sistiana, Trieste - Italy*



*FE/PE type mini finger*



*FE/CA type finger*



*AL/PE type finger*



*FE/PE type finger*



*CA/CLS type finger*



CA/CLS type monolithic floating pier, Dubai Harbour Marina - UAE



CA/CLS type floating pier with rigidly jointed elements, Capo d'Orlando, Messina - Italy



Floating pier FE/CA, Agios Kosmas, Athens - Greece



Floating pier FE/CA, Bosa, Alghero - Italy

## FLOATING PIERS

Piers are of two types: monolithic reinforced concrete modules, similar to CA/CLS pontoons but more robust and with improved functional characteristics or wide metal frame elements obtained by on-site coupling of pontoons, suitably modified and reinforced according to the specific conditions of use. The large size of the modules, their very high displacement and the considerable freeboard height ensure a comfort to the user that is quite comparable to that of fixed structures.

Floating piers maintain all the benefits of modularity and flexibility of prefabricated floating structures. They are intended for the mooring of large vessels in port or lake areas where, in short wave conditions, they also ensure significant dampening of surface waves.

Standard production includes modules with length of 15 and 20m and width of 4.5 and 6.0m. Bespoke elements with the same structural and finishing characteristics can be designed and produced to satisfy specific project requirements.

## FLOATING WAVE ATTENUATORS

Traditional breakwaters generally consist of large masses of reinforced concrete or rocks that extend from the seabed to the surface - thus excluding their use in deep waters - and constitute rigid, permanent installations.

The need to overcome these limitations with more flexible and economical solutions prompted Ingemar, already in the early 1980s, to seek an alternative solution using floating structures. Alongside the construction of marinas with traditional systems, made increasingly difficult by shortage of favourable locations, the new all-floating marinas have emerged, characterised by the reuse of disused port spaces or protected bays, made possible by the deployment of floating wave attenuators and floating pontoons.

Ingemar identified this trend, which is now internationally widespread, back in the 1990s and has since dedicated many resources to the detailed design and laboratory testing of these structures. The aim of these studies is the continuous broadening of the limits of use - height and length of incident waves - and the progressive improvement of their wave mitigation capabilities.

Experience gained suggests that floating wave attenuators are suitable for installations in areas subject to short waves, such as lakes, harbours and already partially sheltered areas, where it is advantageous to create relatively inexpensive barriers that are not based on the seabed and are independent from tide.



Mobile site for construction of breakwater elements 20x6m, Olbia - Italy



Mobile site for construction of breakwater elements 20x8m and 20x10m, La Spezia - Italy



Road transport of wave attenuator elements



Loading for sea transport



Wave attenuator element 20x10m



Floating breakwater FICA 12x3m, Autorità di Sistema Portuale del Mar di Sardegna, Cagliari - Italy



Floating breakwater FICA 20x4m, Porto Montenegro, Tivat - Montenegro



Floating breakwater FICA 20x6m, D-Marin Marina, Gocek - Turkey



Floating breakwater FICA 20x8m, Marina Molo Pagliari, La Spezia - Italy



Floating breakwater FICA 20x10m, Marina Molo Pagliari, La Spezia - Italy

F/CA-type wave attenuators are the result of the experience gained by Ingemar over years of studies and applications in the field of breakwater systems. They consist of prefabricated monolithic reinforced concrete elements with a large expanded polystyrene core and characterised by very high displacement. When connected in series, these modules create floating barriers whose reliability, strength and durability are comparable to traditional fixed jetties.

The cross-section of the elements has two lateral keels that intercept wave energy deeper down and enclose an additional volume of water that maximises the wave-damping capacity.

Attenuators can be constructed in the factory or at the site of installation in the case of larger elements. Anchoring systems to the seabed employ concrete anchoring blocks and chains with, in some cases, the interposition of elastic damping elements, or piles driven into the seabed and sliders.

The elements are produced in standard length of 12 and 20 m and widths of 3, 4, 5, 6, 8 and 10 m with module weight ranging from 28 to 180 t. All types have been tested on laboratory models to verify their attenuation capacity with varying height and period of the incident wave.

Bespoke elements with the same structural and finishing characteristics can be designed and produced to satisfy specific project requirements.

For the evaluation of the effectiveness and safety of new installations, it is indispensable to know precisely the wave conditions, both operational and extreme, at the installation site.

## HARBOUR SERVICES AND ACCESSORIES

Modern and complete utilities management is now generally a must in all large size marinas, whereas even in minor tourist landing stages some basic services are also required. Ingemar's activities extend to designing, installing and providing technical assistance for the distribution of water, energy, lighting and firefighting equipment, sewage and oil disposal and harbour management services. Ingemar's production also includes various models of service bollards and fire-fighting terminals designed to be functional and to comply with the latest and most stringent regulations.

To accompany the floating structures Ingemar offers a complete series of accessories and equipment designed to ensure the perfect functionality and safety of the landings. Special sliding devices with dampening pads secure the floating elements to the anchoring piles in the most severe conditions of use, while for anchoring with concrete blocks and chains, Ingemar developed an innovative semi-elastic system. For mooring rings, cleats and bollards with different capacities (all designed by Ingemar) are available.

Other accessories for safety and functionality of the floating systems include safety ladders, emergency supports with a life buoy, solar LED lights, access lights and step marker lights.



*EROMAR 3 type service bollard*



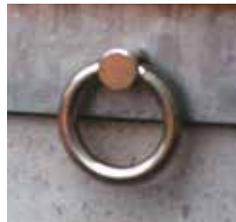
*EROMAR 2 fire-fighting terminal*



*EROMAR 3 fire-fighting terminal*



*Sewage and oil disposal pump-out system*



*Stainless steel mooring ring*



*Aluminium cleat 3t*



*Aluminium cleat 5t*



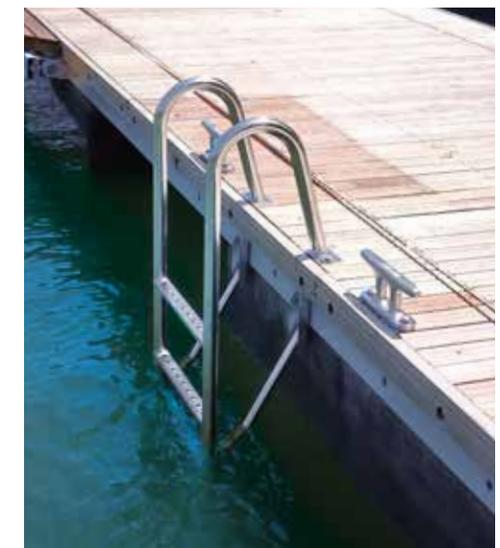
*Aluminium bollard 10t*



*Transfer crane CRANE4A*



*Marine beacon light*



*Stainless steel safety ladder*



*Prefabricated, fixed pontoon, seasonal, Porto Vecchio Marine, Porto Vecchio - France*



*Prefabricated quay, Marina Cala dei Medici, Rosignano - Italy*



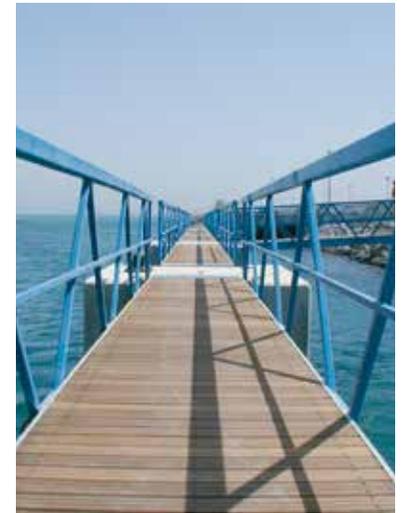
*Renovation of a fixed quay, La Maddonnina, Viareggio - Italy*



*Fixed pontoon for boat mooring, Porto Mirabello, La Spezia - Italy*

## **FIXED PIERS AND QUAYS**

Ingemar's prefabrication techniques have also been successfully applied in the construction and refurbishment of fixed structures such as pontoons, quays and platforms. The construction types of the decks, proven in the harsh marine environment with floating pontoons, made it possible to meet mooring and service requirements even under particularly severe operating conditions. Ingemar's fixed pontoons and walkways, with galvanised steel or aluminium alloy frames and finished with timber decking, are characterised by structural lightness, limited volumes and the least interference possible with the seabed and the circulation of water in the installation sites. The use of natural materials and respect for the shoreline profiles contribute to the harmonious integration of the fixed structures in the environmental context, where they often blend homogeneously with pontoons and mooring fingers.



*Fixed access walkways, Al Fintas Naval Base - Kuwait*



*Fixed platform, Golfo dei Poeti, Porto Venere - Italy*

## SPECIAL STRUCTURES

The experience gained in the construction of floating structures and great technical and design flexibility provided Ingemar with the technical know-how necessary to deliver new floating solutions to projects beyond the nautical sector:

The installations are numerous and very diverse: floating buildings and floating crossings, landing stations for passenger boats and military vessels, platforms for sport and leisure as well as industrial structures are just a few examples of Ingemar's references in this exciting field of application of floating structures.



*Ponte del Redentore, Canale della Giudecca, Venice - Italy*



*Athens Olympic Games 2004 - Greece*



*Floating rowing centre, River Tiber, Rome - Italy*



*Marina Azzurra Resort, Lignano, Udine - Italy*



*Floating pumping station, Lake Naro, Agrigento - Italy*



*Coast Guard pontoons, Al Fintas - Kuwait*



*Pontoons for fishing boats, Taranto - Italy*



*Piers for Coast Guard, Dammam - Saudi Arabia*



*Floating bathing platform, Porto Antico, Genova - Italy*



Floating platform, Certosa Island, Venice - Italy



Floating club house, Ravenna Yacht Club, Ravenna - Italy



Floating piers for tug boats, Port Authority, La Spezia - Italy

There are several sectors in which Ingemar was able to provide a viable floating alternative to traditional fixed structures with innovative solutions, all tailor-made and designed for specific needs.

**Sport and leisure time:**

- Platforms for boat centres
- Floating stages
- Floating restaurants
- Bathing platforms
- Floating exhibition spaces

**Industry:**

- Pumping stations
- Pontoons for carrying electrodes
- Pontoons for fishing ports
- Floating barriers

**Transport:**

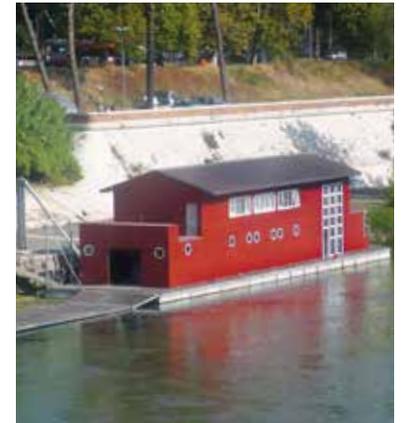
- Docks for passenger boats
- Floating crossings
- Floating bridges
- Pontoons for loading and unloading

**Sport and competition:**

- Racing platforms
- Floating slipways
- Pontoons for canoeing and kayak

**Defence:**

- Docks for navy vessels
- Landings for border guard
- Pontoons for public services
- Docks for tug boats



Floating nautic centre, I.U.S.M, Rome - Italy



Landing platform for Coast Guard, Jeddah - Saudi Arabia

## EVENTS ON THE WATER

Over the years, Ingemar's technical capabilities and production diversification enabled the company to successfully tackle the specific issues of events on the water and boat shows. Customised designs and rapid intervention have been the winning points of the innovative solutions to very special requirements, as in the case of the floating pavilion for the Biennale of Architecture in Venice, the floating stage in Viareggio and the floating platforms for the Navigli festival in Milan. The flexibility and versatility of Ingemar's standard modules, on the other hand, proved to be successful in the case of sporting events such as the Vele d'Epoca trophy in Imperia, the Italian events of the Louis Vuitton Cup in Naples and Venice, the Offshore Powerboat World Championship in Chioggia, the maritime festival in La Spezia and the Riva shipyards' vintage boat rallies in Sarnico and Venice. Ingemar's greatest success, however, is its presence at the most important Italian boat shows. Since 2005, the Genoa International Boat Show has been a true showcase for Ingemar, participating as technical partner of the exhibition with the supply of approx 10,000 square metres for the furnishing of the floating exhibition area. The collaboration with the Venice International Boat Show began in 2006 and over the last 3 years has seen Ingemar's piers and floating platforms hosting boats and events in the stunning setting of the Serenissima's historic Arsenal.



*International Boat Show, Genoa 2011, Genoa - Italy*



*Venice Boat Show 2022, Venice - Italy*



*Canoe World Championship, Milano - Italy*



*Laser Cup, Venice - Italy*



*Offshore World Championship, Chioggia - Italy*

## INGEMAR PLANT



Deck assembly division



Concrete casting division



View of the plant storage area



Outdoor area for construction, storage and loading of large CA/CLS products

Since 2003, all Ingemar group's activities have been concentrated in the new plant in Casale sul Sile, halfway between Treviso and Venice, while the company's registered office and top management functions remain in Milan, where it was founded in 1979.

The production unit consists of about 2000sqm of covered area for the offices and the factory and 6000sqm of equipped areas for loading, handling and storage of materials and the production of prefabricated elements in special retractable sheds.

The assembly of the metal frames of the pontoons with the timber decking and finishings, the addition of mechanical parts and special structures are carried out inside the factory, with the assistance of 4 overhead travelling cranes.

In another department, the floating concrete units for the metal frame pontoons and the smaller all concrete floating pontoons are cast, their dimensions up to 12x3x1.20m. The outdoor areas, in the retractable sheds, are dedicated to the construction of pontoon modules with dimensions up to 20x4x2.40m.

A fixed construction crane and an overhead crane cover practically the entire outside area of the factory, assisting with the casting of all-concrete modules, the handling of the stored materials and the loading of the manufactured goods onto trucks.

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