



Ingegneria Marittima

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Press Release

## **A BODY IMMERSED IN A FLUID IS ACTED UPON BY AN UPWARD FORCE EQUAL TO THE WEIGHT OF THE DISPLACED LIQUID**

*(Archimedes 287-212 a.C.)*

***Ingemar floating systems are still based on the principle of the famous physicist from Syracuse, but they look to the future with experiments and strict functional tests for new solutions that often anticipate the times and market demands.***

**Milan, April 14th, 2022** Statistics confirm the continuous increase of the dimensions of boats at a global level and the structures designed to accommodate them require new dedicated water spaces and mooring infrastructure adapted to the new extra-large sizes.

The growing interest in the use of breakwaters and large pontoons meant that in 2021 the most important Ingemar projects, both in Italy and abroad, were developed in this area. As a result, the Casale Group decided to start mass production of new floating modules in reinforced concrete and polystyrene, destined to complete the range of elements already present in the catalogue.

As all Ingemar products, the new breakwaters are the result of specific tests on a physical model in a tank, conducted in the Laboratory of Maritime Constructions of the University of Padua. The tests were set up to verify the effectiveness in attenuating wave motion of the breakwaters and determine the loads for their anchorage to the seabed.

**NEW BREAKWATER MODULES** Ingemar put into production a new series of 6m wide 130t modules and now has a complete offer of elements 20m long, from 4 to 10m wide weighing from 79 to 185t.

As for the other installations, for example the 8x20m and 10x20m breakwaters in La Spezia, the new elements were produced close to the installation site with the use of the innovative Ingemar mobile yard that delocalizes the production of the biggest items and reduces the high costs of their handling. In Olbia, the production of 22 breakwaters weighing 130t each was completed on site. Then the elements were towed to their final location to form the backbone of the new tourist ports of Cala dei Sardi in the Gulf of Cugnana and Cala Balbiano on the island of La Maddalena.

**NEW ANCHORAGE WITH SPECIAL ELASTOMERS** In order to connect these new huge modules to the seabed, the Ingemar Research & Development Department tested and developed a new type of **semi-elastic anchorage**, performing better than traditional anchoring systems with chains and mooring blocks. The semi-elastic anchorage consists of an inextensible part - traditional chain or rope - and an elastic element with predefined load/elongation characteristics.

The design phase has been particularly long and onerous and required numerous tests to identify and select the elastomers with the most suitable chemical and physical characteristics and to optimize, with three-dimensional modeling systems and finite element calculations, the shape and size of the first prototypes. The prototypes were subjected to tensile stress with loads up to 100t and allowed to define realistically the behavior of each

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component and to reconstruct mathematically the load and elongation curve of each elastic link.

The best performing types were used for the anchorage of breakwater modules of 20x6m in situations where the shallow water made the traditional systems with chains and ropes unsuitable. The "in the field" results are most satisfactory and have shown the ability of progressive damping with the absence of load peaks on the anchorages and the stability of the planimetric structure of the barriers in different conditions of stress of wave motion.

## NEW FLOATERS FOR FINGERS

Following the trend of maximizing the width of moorings where possible, Ingemar developed a **new type of floater** in rotational polyethylene and expanded polystyrene core, with smaller dimensions, destined for finger moorings. Its shape, designed to ensure the necessary buoyancy reserve and to adapt to all finger types in production, integrates a system of protection of the finger tip against accidental impacts with space for customization with identification plates.

In addition to the study of new structures with increasingly large volumes and displacements and innovative technological components, Ingemar has also invested energy and resources in identifying potential opportunities for the use of its floating systems in unconventional environments. Already in the past the Group distinguished itself by innovative ad hoc structures for special uses, such as: exhibition areas for the Venice Biennale, temporary bridges for the main celebrations of the lagoon city, mooring structures and connections for the Italian boat shows, floating constructions for nautical and sports clubs, paths and walkways for inland basins and platforms for industrial use, such as those for the oil industry in Kuwait or the electrode-holder for the cable duct that ensures the connections of Greece with Italy. Today, new projects propose original technical and plant engineering solutions, also with a view to optimizing space and protecting ecosystems, such as in:

**Monte Carlo - Principality of Monaco** The installation of a new floating pier for the mooring of Princess Gabrielle and Libecciu vessels of the "Department of Maritime and Airport Police" in Port Hercule has been completed. Ingemar designed a very special structure characterized by 2 sections of different width, one of 3m and the other of 2m, with a new raised walking surface equipped with a sloping access ramp to facilitate access to the largest unit. Inside the raised part there are technical compartments accessible from one side, for the installation of safety and prevention equipment.

**Santa Manza - Corsica** The Corsican Marina, already an example of "virtuous settlement" with its 350m of Ingemar "All Concrete" piers that are removed during the winter season, modified its lay-out by installing a new access pier with a fiberglass grid walking surface, designed and constructed to let the light filter through the decking in order not to compromise the local marine settlements of Poseidonia.

For more than 40 years Ingemar has been designing and building pontoons and floating breakwaters in Italy and abroad. Today it is one of the few companies in the sector to have its own independent production facilities, enabling it to carry out Research and Development in anticipation of market demands. ISO 9001 certification for design, construction and installation gives testimony to the company's constant dedication and commitment to quality. In addition, the company holds SOA certification in the port sector for commissions of up to Euro 15.5 million. The company's Headquarters are in Milan, where it was founded in 1979, while all the operational activities are concentrated in Casale sul Sile (Treviso). The Ingemar Group consists of the Ingemar parent company, responsible for design and maritime engineering, and its sister company Inge Real Estate, which manages the real estate initiatives of the Group. Fb: IngemarGroup - Ig: ingemar\_1979