Oceanographic Research Platform

Antoni Mànuel, Jaume Guasch
SARTI – CTVG. Rambla Exposició, s/n
08800 Vilanova i la Geltrú (Barcelona) SPAIN.
+3493 896 72 00 -

1. Abstract
A singular research facility, taking advantage of and old fish plant structure, is presented in this paper. The current project describes the objectives, the possibilities and the main scientific applications of this future oceanographic research facility.

2. Antecedents
At the beginning of 2004, the cession of an old fish plant suggests the possibility of using it as a scientific platform. The structure was built 13 years ago, formed by 30, 12m height stainless steel pilasters. It has a 27m edge hexagon shape holding seven 9m hexagonal cubicles and it's fixed by four anchorages to the bottom of the sea, currently placed at 30m. The platform, by means of a hydraulic pumping system, changes its degree of floatability up to 6m height adjusting the ballast of the pilasters. Figure 1 shows the basic structure.

The conversion of this structure to an Oceanographic Research Platform (ORP) is planned. The result, due to its size, would be a highly stable oceanic base. A unique opportunity to perform different kind of high resolution marine scientific studies (oceanography, marine biology, marine geosciences, etc.) and also to carry out tests on different kind of marine sensors and at real conditions, enabling a better and greater development of several marine technologies as geophysics, acoustics, telecommunications, etc. Another crucial factor is the possibility to obtain temporary series of oceanographic parameters in a stable and precise way.

3. The ORP Project
The project interest is based on the opportunity of having a versatile facility that is easily adapted to deploy a large variety of devices and scientific sensors allowing the installation of research spaces, laboratories and rooms to stay for a short or long period of time. The modular concept offers a significant flexibility in the facilities and equipment installation and the majority of applications may be easily accommodated. Sensors may be attached to the structure or to the existing pilasters. Alternatively, they may be deployed using the structure or the pilasters to reach the sea.

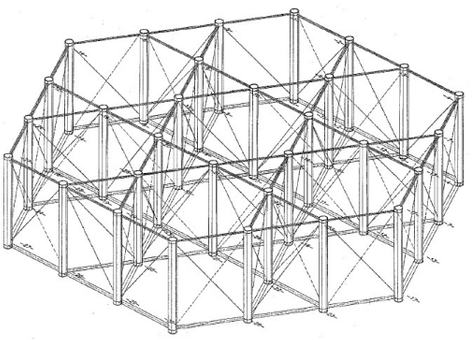

Figure 1. Base structure of ORP

The exclusive capacities of ORP as a marine platform suggest a wide range of usage modes and applications. Many research projects would be multidisciplinary programs, as follows:

-Validation, characterization and calibration of local and remote marine sensors and apparatus.
-Study of materials exposed to marine conditions and medium [1].
-Fixed point of observation and correlation for biologic and meteorological measures, for short, medium or large periods of time.
-Study of propagation or dispersion phenomenon, ambient noise, turbulence and its relationship with ambient, marine or atmospheric parameters.
-Energy transfer between the sea and the atmosphere.
-Biological experiments with marine species, population studies, ambient conditions influence and fish feeding optimization.
-Studies on the climatic change and its effects on the ecosystem [2].

4. Objectives to achieve
The main concern now is the refurbishment of the structure. The refurbishment and adaptation project for the ORP elements must be oriented to fulfill the following conditions:

a. The accomplishment of the current legislation must me assured. The facility has to enforce the aspects related to the Spanish Shore Law [3] and its development as Royal Decree [4], regarding the use of the marine public domain.

b. It has to assure the accomplishment of safety regulations and requirements regarding a scientific or industrial facility. Structural and personal protection elements must be put in

place to guarantee people security during the stay and the access to the facility.

c. It has to provide the required elements to allow people and tools onboard, as elements to facilitate access from or to a boat and the fixture to provide mooring capacity. Elements to reach the water, where places may be defined to access the sea, should also be provided.

d. Load and transportation elements availability. Lifting weights from a boat to the platform load area and vice versa has to be possible.

e. Basic habitability and control elements must be in place as: toilets, showers, office, kitchen, storage room, engine room, etc. It is assumed that ORP may hold independent and multidisciplinary teams up to 15 or 20 people working at the same time onboard.

5. Working progress

With a partial fund that has been assigned as a complementary action by the Spanish Ministry of Education and Science, several structural and preservation studies has been performed at the platform current location of l'Ametlla de Mar, near Tarragona. From one hand, thickness measurements of stainless steel columns and other structural elements have been obtained. From the other hand, a complete submarine revision has been carried out looking for any defect in valves, locks, fixtures, floating elements or structural elements.

Based on the obtained results, a final project is being written to define the reconstruction and preservation of the structure taking into account the previously indicated objectives. This project is, as well, in the frame of the documentation and official steps to legalize and to transport the facility from its current location to Vilanova i la Geltú. Additionally, an exploitation plan is being studied and prepared in order to define the operation and maintenance procedures.

6. Conclusions

Providing that the necessary investment and resources to adapt and to exploit the structure are approved, an unprecedented occasion will be presented allowing the scientific community to access a station prepared to host real marine experiments at a national and international level.

Figure 2. A current image of the platform

There is no similar facility in Europe dedicatd to scientific or technical purposes. Therefore, the ORP would signify, without any doubt, a very singular facility having the capacity to receive multiple multidisciplinary research and technical teams.

7. References

[1] Miyano, Y, et al. Corrosion behavior of Stainless Steel Welds by Microbes in Marine Water. Quarterly Journal of the Japan Welding Society. Vol. 22, no. 3, pp. 443-450. Aug. 2004

[2] Aiken, J, et al. Remote sensing of oceanic biology in relation to global climate change. Journal of Phycology [J. PHYCOL.]. Vol. 28, no. 5, pp. 579-590. 1992.

[3] Ley 22/1988, de 28 de julio de 1988, de costas. BOE 181 de 29/06/88.

[4] Real Decreto 1471/1989 de aprobación, desarrollo y ejecución de la Ley 22/1988.