PHOTO 1

THE WORK OF WIDENING THE PORT, EXTENDING THE ALREADY EXISTING MOLE AND THE CREATION OF AN ARTIFICIAL BREAKWATER BARRIER HAVE RETURNED THE PORT OF SANTA MARIA DI LEUCA (ITALY) TO A NATURAL AND SAFE PLACE FOR SMALL BOATS.

by Giuliano Traversini and Ernesto Erali*

TETRAPODS FOR DEFENCE

In the land of the Salento, where the Mediterranean sun illuminates and brightens every colour, there is a privileged "emporium" in the history of commerce, culture and custom. There is the port of Santa Maria di Leuca, uncontaminated landing place with its beautiful landscape and geography.
A natural landing place that the council of Castrignano del Capo (LE), in their tourist development programme, has wanted to protect with a project that respects and safeguards the environment.
The works, once the project was approved and financed, planned for the widening of the port and, amongst other work to realise, also the extension of the already existing mole, a load bearing structure of material and elements of various forms and dimensions, for the creation of an artificial breakwater barrier.
The execution of the work lasted approximately two years and on the occasion of its inauguration, in July 1995, a celebration was organized on a national level that attracted large numbers of period boat enthusiasts, creating a particular atmosphere and an enchanting spectacle.
Actually Santa Maria di Leuca, as well as accommodating the local fishing fleet, is a secure and natural harbour for those boats that from the centre of the Mediterranean are directed towards nearby Greece and the eastern countries.

Avant-garde technology in defence of the port

Barrier tetrapods
The artificial breakwater barrier has been constructed using special concrete tetrapods that, due to the short time available for the undertaking and the confined space of the construction site, had to be rapidly placed in the sea. To solve these problems, the most significant being insufficient storage space, a concrete was necessary that allowed the breaking of the moulds 16 hours after the pour, and successive moving after 48 hours.
The structure of the tetrapod, taking into account the dimensions (20 m^3 of volume for approx. 40 t weight), was under considerable mechanical stress.
The accurate mix-design of the cement

PHOTO 2

** PR officer of Colacem SpA, Gubbio (PG)*

Photo 1
Site storage of the breakwater elements

Photo 2
Moving the tetrapods

PHOTO 3

PHOTO 4

PHOTO 5

PHOTO 6

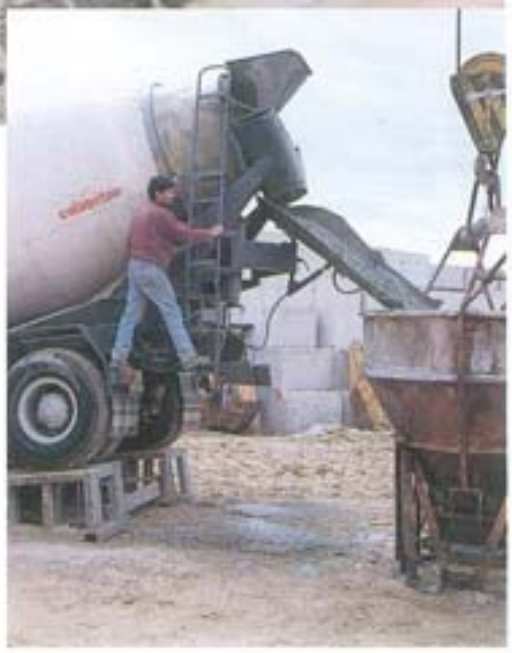

Photo 3
Class of consistency of concrete S3 semifluid

Photos 4 and 5
Detail of a zone of the artificial barrier

Photo 6
Placing of the concrete, for the breakwater structure, in the water

mixture, prepared by Colabeton technicians in collaboration with the works management, has permitted the achievement of elevated production (up to 400 m^3 per day) and high mechanical resistance with short curing times.
The necessity of improving the mechanical performance of the concrete and accelerating the kinetics of hydration of the cement required the addition to the cement conglomerate of the enhanced hyperplasticiser MAPEFLUID IF328. The additive, dosed at the rate of 1-1,5 lt. for every 100 kg of cement, has made possible the containment of the W/C (water/cement) ratio within a maximum value of 0,50 and the achievement of a S3 semifluid class of consistency, considered to be suitable for the correct installation and compaction of the concrete.
All the operative choices adopted, including that relating to the utilization of an aggregate with a maximum diameter of 40 mm, have allowed production of a conglomerate with good characteristics of impermeability and cohesion.

PHOTO 7

Photo 7
Panorama of the port of Santa Maria di Leuca after the widening work.

Load bearing structure

Moreover, inside the port a load bearing structure has been built in order to alleviate the force of the marine currents; the proportioning of the concrete has been formulated taking into account that installation had to be effected directly into water and that resistance to corrosion and scouring had to be guaranteed.
Scouring has been prevented thanks to the adoption of a W/C ratio below 0,50, an elevated class of fluidity and a granulometric assortment slightly over grit. Also in this specific mix it has been possible to reconcile the low W/C ratio and high fluidity of the mix, by using the superplasticiser additive MAPEFLUID N200 (1 lt/100 kg of cement). ❑

TECHNICAL DATA

Project: Extention of the port of Santa Maria di Leuca - Castrignano del Capo (LE - Italy)

Year of construction: 1994-1995

Client: Council of Castrignano del Capo (LE)

Contractor:
Temporary consortium of:
Dott. Carlo Agnese S.p.A.
Edilizia Ligure
Sicem S.r.l.

Construction supervisor: Eng. Primo Stasi

Jobsite supervisor: Geom. Enrico Cella

Concrete supplier: Colabeton S.r.l.

Products for the cement conglomerates:
MAPEFLUID IF328
MAPEFLUID N200

This product is available in large quantities or in bulk tanks.

The technical sheets of the products mentioned in this article are contained in Mapei binder number 3 "Building line".