

Turbog farming tanks

by Francisco Conde Rodríguez and Manuel Ángel López*



In April 1999, Evotec S.L. was awarded the contract for the waterproofing, protection, and soundproofing of a tank used for turbot farming in Cambados (Pontevedra) in Spain.

It had been decided that asphaltic SBS linear panels would be used for the waterproofing of the outside wall and the covering. However, this solution meant that there was still much doubt about the waterproofing and protection of the inside of the tank, which was the first of



its kind in Europe.

Under the supervision of Unitec, the company responsible for drawing up the project plans, Evotec began work using a series of options which would provide utterly reliable and guaranteed solutions and that would also ensure the following:

- complete and constant waterproofing of the inside walls and substrate, thus making the tank watertight;
- no alteration whatsoever due to permanent contact with sea water;
- no alteration whatsoever due to contact with ozone, the purification agent used;
- resolution of the problems associated with fixing HDPE piping in the concrete walls;
- harmlessness to fish being raised in the tank;
- a non-aggressive surface.

Working on this basis, Evotec created a suitable solution which the Technical Management Team at Ibermapei, a Mapei subsidiary in Spain, approved in full. We will describe it in the following sections.

Principle characteristics of the tank

The tank consists of three cylindrical rings of pozzolanic H-250-12 concrete with internal radiuses of 24.95, 13.7 and 6.9 metres respectively. These rest on a H-250-12 concrete substrate which itself has a radius of 24.35 metres.

All of the walls are 30 cm thick. The structure consists of one tank which is used for turbot production, a second used for fry development, and one tank for water sedimentation and purification. It also includes three rooms containing machines, electrical power sets, and computer control stations for the whole plant.

Application of the waterproof and protective covering

The phases completed in the various areas of the plant were as follows:

• Turbot production area

The work done here consisted of:

- pressure cleaning the walls and substrate;
- plugging the insulating pipes with MAPEGROUT FAST-SET, a fast-setting, fibre-reinforced mortar.
- using MAPEGROUT FAST-SET to make 240 m of perimeter profile with a radius of 23.95 m and another with a radius of 13.7 m;
- application of a covering using MAPELASTIC, a two-component waterproof flexible cement mortar, to the 23.95 m and 13.7 m radius walls to a height of 5.7 m over the final level of the



base.

2,562 square metres of covering were applied in all between the base and walls.

• Fry development area

The work done here was the same as that carried out in the turbot production section. This area is smaller with two radiuses of 12.35 m and 8.25 m and a height of 1.3 m, at a height of 6 m in the tank, requiring 130 m of profiles and 435 square metres of covering.

• Sealing of insulating HDPE pipes

Once the protective, waterproofing covering had been created, the concrete was divided into various sections at various heights in the tank to allow the passing and connection of the HDPE pipes which would carry various fluids. This obviously meant that the waterproofing had to be done again at these critical points. This work was carried out as follows:

- IDROSTOP, a hydrophilic expandable



1. Exterior view of the tank with power supply and ventilation system

2. Close-up of tank cover

3. Close-up of main tank with MAPELASTIC covering (before final cleaning)



rubber section, was used to make a profile along the circumference of the various pipes. It was held in place using IDROSTOP MASTIC, a single-component adhesive;

- next, a MAPEGROUT HI-FLOW, a fibre-reinforced fluid mortar was poured in;
- the final finishing touch came courtesy of LAMPOSILEX, an ultra-fast setting binder;
- MAPELASTIC was also applied at these points to ensure that the covering would not be broken.

44 HDPE pipes of different diameters were completed in this way.

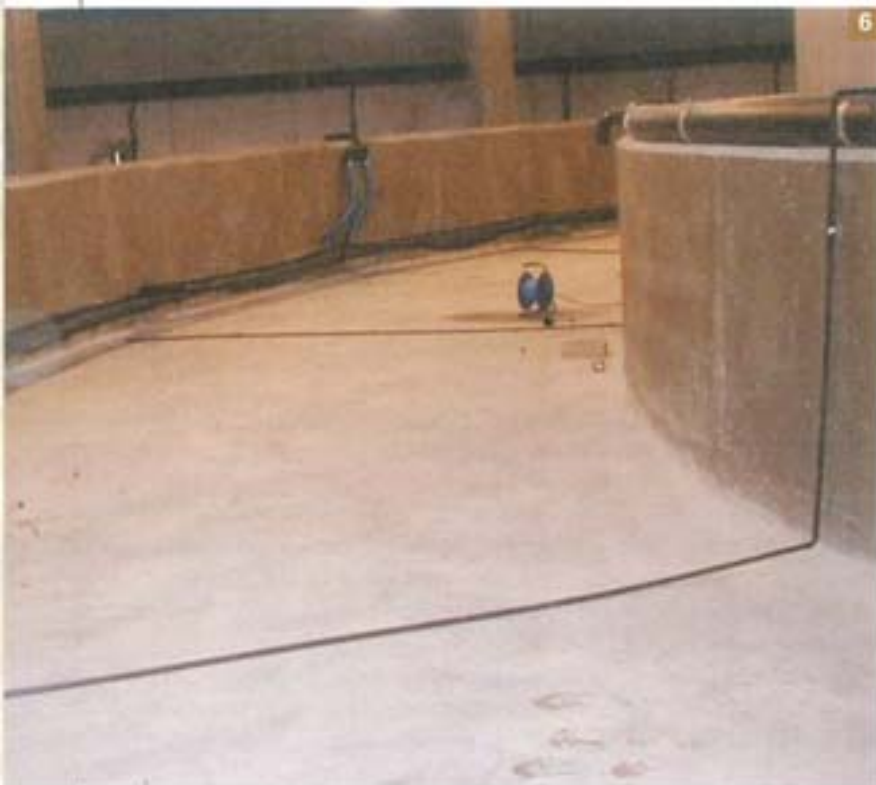


A successful job

As the time available to do the job was very short (under a month!), we worked very, very hard during the construction of the various sections to allow the installation of the other elements of the tank. This meant that it was possible to carry out the load test using saltwater very quickly. Despite the unusual nature of the job and the difficulties involved, the work done proved a complete success, doing very well at the critical points which had been giving the designers cause for concern.

**Francisco Conde Rodríguez, Technical Industrial Engineer, Technical Director of Evotec*

**Manuel Ángel López Technical-commercial Director Ibermapel*



4. Fixing of the HDPE pipes into the wall of the main tank

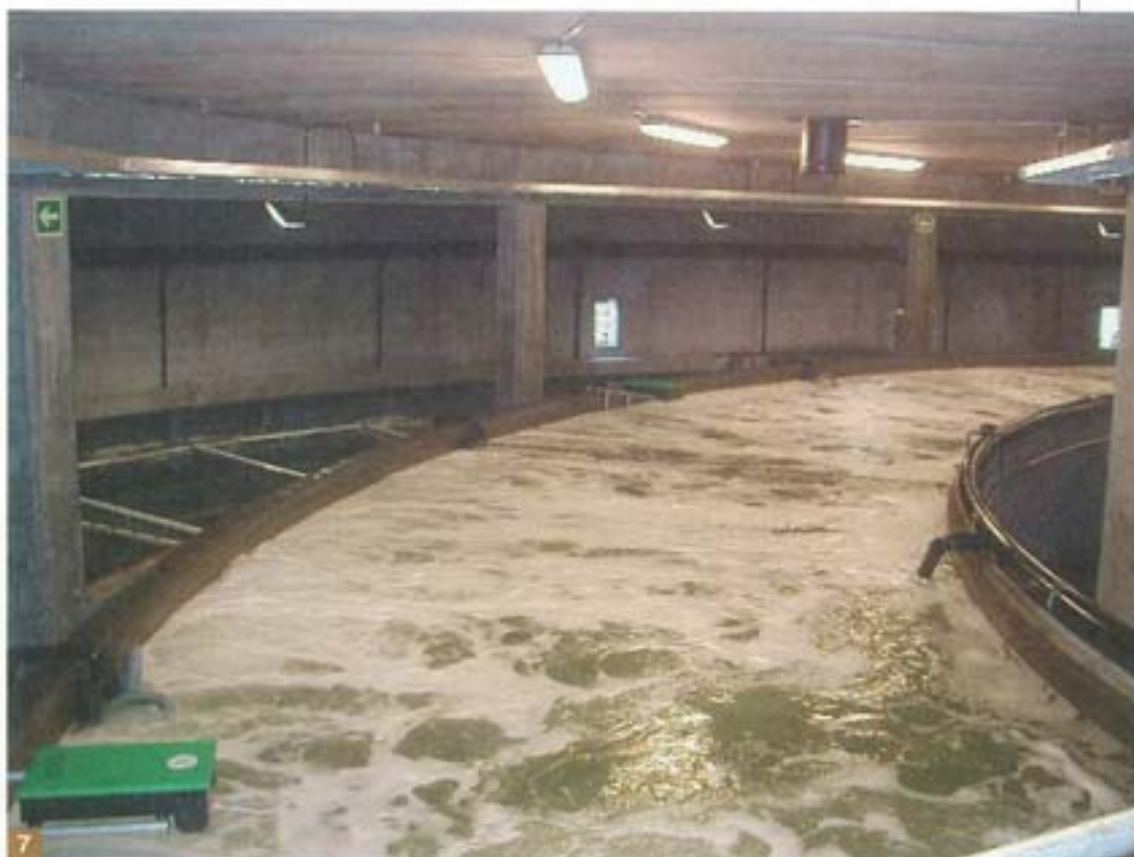
5. HDPE pipes in main tank after sealing

6. Fry tank covered with MAPELASTIC (before final cleaning)

7. Load test with addition of oxygen before opening

8. View of turbot cages and their automatic movement system





TECHNICAL DATA

Turbot farming and production tank -
Cambados (Pontevedra) - Spain

Work done: 1999 (began 14 June,
finished 10 July)

Client: Acuacria Arousa, S.L.

Design: Unitec

Works Manager: D. Marcial de la Fuente, civil
engineer.

Builders: OHL

Waterproofing company: Evotec S.L.

Waterproofing and protection products:

MAPELASTIC
MAPEGROUT FAST-SET
IDROSTOP
IDROSTOP MASTIC
MAPEGROUT HI-FLOW
LAMPOSILEX

Mapei co-ordination: Manuel Ángel López

*The Technical Data Sheets of the
products mentioned in this article
are contained in Mapei binder
no. 3 Building Line.*

