

## Marghera (Province of Venice, Italy)

# Dry docks

### CONCRETE REPAIR AND WATERPROOFING IN THE FINCANTIERI SHIPYARD

The Ernesto Breda shipyard in Marghera (Province of Venice, Italy) was constructed after the First World War when Venice became an important industrial port. After changing ownership several times, it underwent radical restoration work between 1973 and 1978, which included the construction of a new dry dock to accommodate ships with a tonnage of up to 150,000 tonnes.

The yard at Porto Marghera was transformed into a particularly advanced complex and in 1984 was bought by Fincantieri SpA, one of the world's largest shipbuilding groups which, in recent years, became specialised in the construction of cruise liners.

#### Deterioration of the concrete in the dry docks

The dry dock is 334 m long, from the horseshoe-shaped

rear end to the gate, and 54 m wide.

The walls have a constant thickness of 1.4 m for 7.45 m of their height, with a 1 m high bottom section of wall which is 30 cm thicker. To form the trench where the dock was inserted a reinforced and anchored diaphragm was created, with the walls of the dock sitting against the exposed concrete.

Between 2020 and 2021 the dock was completely refurbished due to deterioration of the concrete caused by the penetration of chloride salts, which had reached down as far as the reinforcement rods, and in some parts, had even gone past the reinforcement rods. The renovation work had three objectives:

- eliminate leaks and water seepage from the facing wall, as well as the formation of stains caused by damp, for a



**IN THE FACING PAGE.** A view of the Fincantieri shipyard in Marghera, near Venice. **ABOVE.** Reinforcing rods were protected with MAPEFER anti-corrosion mortar (left), while several Mapei solutions were used to waterproof and repair the dock walls (right).

- period of at least 10 years from the completion of work;
- protect the reinforced concrete facing walls and reinforcement rods to guarantee at least 4 cm of concrete cover over the external frame and 3 cm in the areas not filled with water;
- prevent water infiltrating through the vertical joints and foundation slab.

#### Restoring the strength and waterproofing capacity of the concrete

Numerous Mapei products were used to repair the concrete of the dock walls. This was a particularly special project because of the sheer size of the structure, the amount of materials supplied and the complexity of the work carried out over such a large area of operations. Once the surfaces had been scarified and the deteriorated concrete had been removed, the walls were waterproofed as follows:

- water seepage was temporarily blocked with ADESILEX PG1 and LAMPOSILEX;
- packers were placed in the sections most damaged by water seepage and RESFOAM 1K-M one-component, ultra-fluid polyurethane resin was injected through them to ensure waterproofing at a deep level;

- FOAMJET J two-component polyurethane resin was injected where required, which is used to consolidate and waterproof structures with water leaks. Thanks to its high fluidity, FOAMJET F manages to penetrate and seal cracks that are even just several hundreds of microns wide.

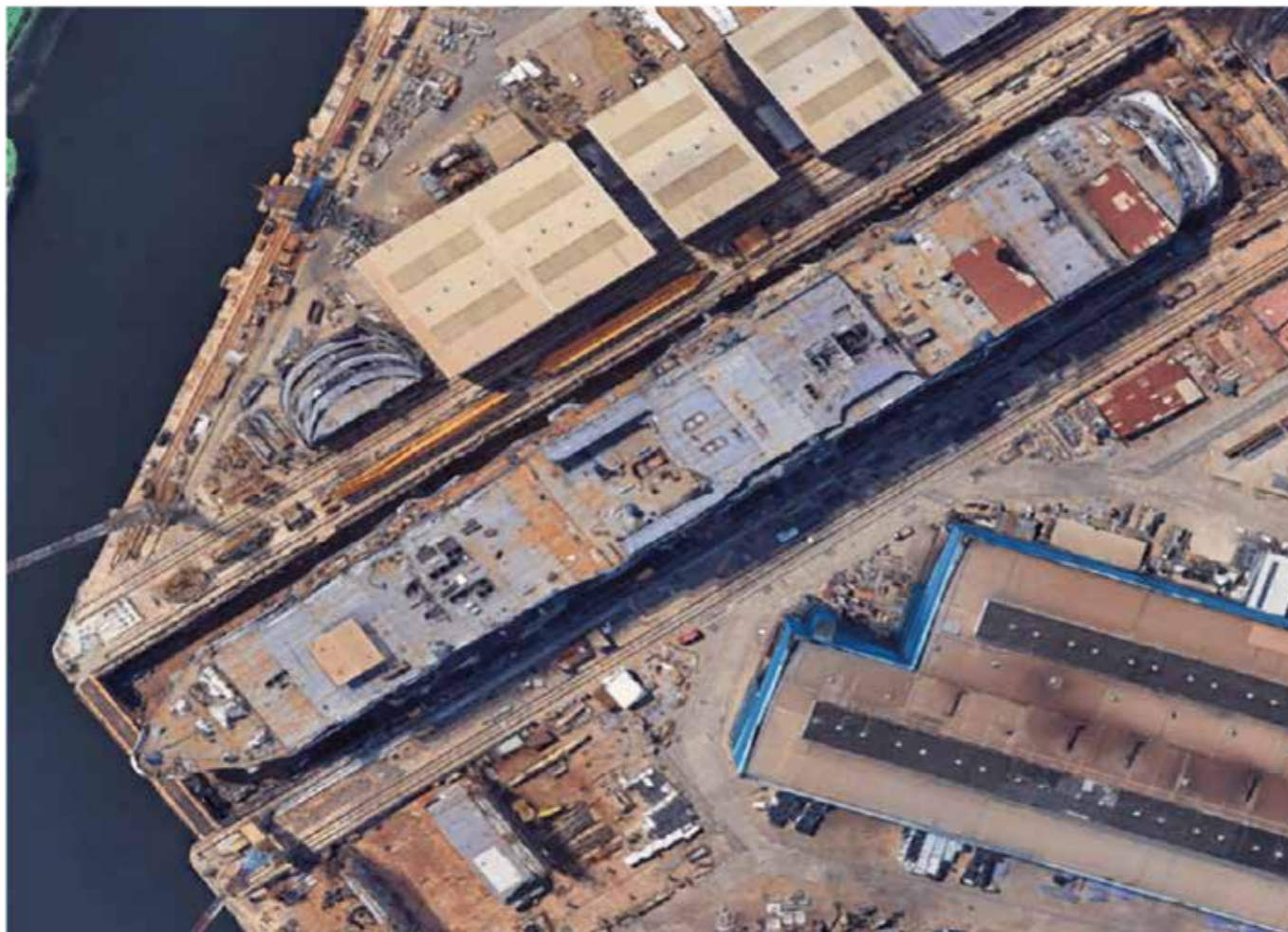
The reinforcing rods were treated with MAPEFER anti-corrosion cementitious mortar.

MAPEGROUT EASY FLOW one-component, fibre-reinforced, thixotropic mortar was used to repair the concrete. Once hardened, this mortar is highly watertight and resistant to the aggressive action of sulphate salts and adheres perfectly to concrete surfaces.

Concrete surfaces were then treated with MAPELASTIC FOUNDATION two-component, flexible cementitious mortar, which was chosen to provide additional waterproofing capacity to the concrete surfaces. Once cured, this mortar is resistant to soluble salts such as chlorides and sulphates present in seawater or in the ground.



Find out more  
MAPELASTIC FOUNDATION



**TECHNICAL DATA**  
**Dry docks, Fincantieri shipyard,** Marghera (Province of Venice, Italy)  
**Year of construction:** 1974  
**Period of the Mapei intervention:** 2020/2021  
**Intervention by Mapei:** supplying products

and technical support for concrete repair and waterproofing concrete surfaces  
**Owner:** Fincantieri SpA  
**Design:** Studio IGT, Giovanni Tripoli  
**Works direction:** Giovanni Tripoli

**Contractor:** Edil Merello  
**Mapei coordinators:** Claudio Azzena and Gianpiero Peluso, Mapei SpA (Italy)

**MAPEI PRODUCTS**  
**Waterproofing works:** Adesilex PG1, Lamposilex,

Mapelastik Foundation, Resfoam 1K-M, Foamjet F  
**Protecting reinforcing rods:** Mapefer  
**Concrete repair:** Mapegrout Easy Flow

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