



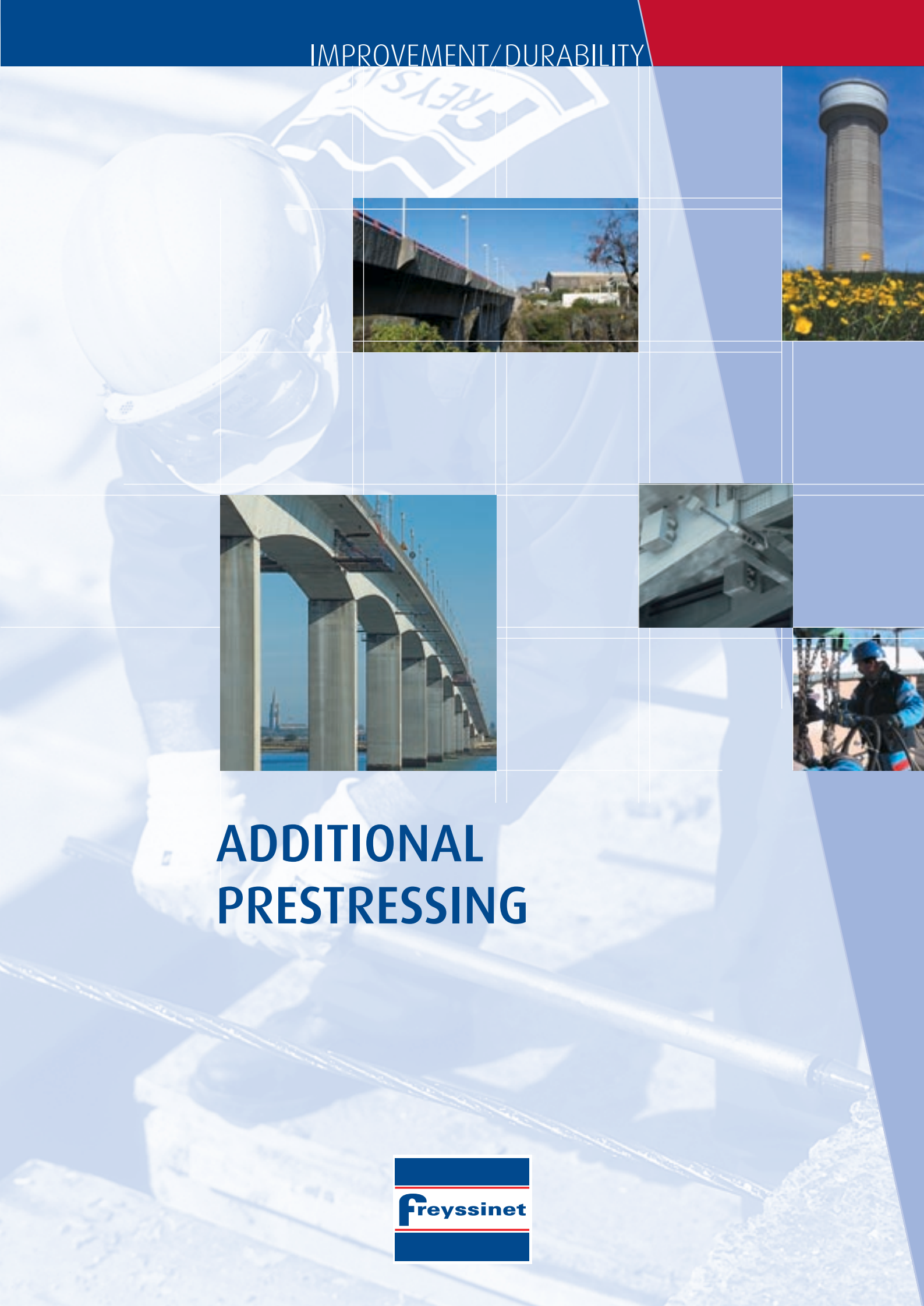
- 1** Strengthening of bottom ring beams around the St Fargeau-Ponthierry reservoirs by additional prestressing (Seine-et-Marne Department, France)
- 2** Consolidation of aircraft bridge No. 5 in Orly (Val-de-Marne Department, France)
- 3** Consolidation of piers for the Pierre Bridge in Bordeaux (Gironde Department, France)
- 4** Installation of active tie-rods on the Modern and Contemporary Art Building in Toulouse (Haute-Garonne Department, France)
- 5** Strengthening of the Val-de-Durance viaduct by temporary additional prestressing (Vaucluse Department, France)



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## ADDITIONAL PRESTRESSING



# PATHOLOGIES...

Additional prestressing consists of adding external forces to modify the stress condition of an existing structure (reinforced or prestressed concrete, masonry or wooden structures), so that it can be restored to its original working condition or even to increase its load bearing capacity.

## Fields of application:

- building elements: slabs, beams, deep beams, tie beams, foundations, etc.;
- slab bridges or box bridges;
- circular structures: water towers, silos, penstocks, industrial storage tanks.

## Main needs of additional prestressing:

- insufficient bending resistance or diametric compression due to weakening;
- making structures conform, particularly in terms of earthquake resistance;
- new operating constraints;
- repair of new structures following accidental loading;
- tightening of temporary or permanent elements for structural modifications (corbels, anchor bushings, deviators, etc.);
- temporary prestressing for safeguarding.

## Freyssinet proposes external prestressing adapted to the existing situation:

- access conditions;
- environment of the structure;
- ambient environment;
- structural operating conditions.

Freysinet has more than fifty years experience and innovation in repair and strengthening techniques, and offers its skills and know how as a specialized main contractor to designers and customers.



# SOLUTIONS

Freysinet is continuously searching for optimised solutions to be able to perform strengthening works by additional prestressing in accordance with the state of the art, while minimizing inconvenience to operations and nuisance to the environment. The Freyssinet prestressing system is broken down into several product ranges approved by the EOTA (European Organization for Technical Approvals).

## Freyssinet anchor systems and processes such as:

- tendons with isolated unbonded strands;
- tendons with bare strands grouped in a wax-injected duct;
- tendons with unbonded strands grouped in a high-density polyethylene duct into which cement grout has been injected (Freysinet patent);
- short prestressing for clamping and pinning of elements to structures;

allow strengthening solutions suitable to the geometry of the structure and its stressed state, with or without changing the cross section.

## Longitudinal profiles:

- centred or eccentric linear prestressing;
- deviated prestressing: arrangement and dimensions of metallic or prefabricated concrete deviators.

## Choices adapted to needs:

- optimised sizing of elements used;
- ducts made of a protected steel tube or a flexible high-density polyethylene pipe, or notes drilled in the structure;
- placement of tendon anti-vibration systems;
- consideration of dismantling requirements;
- subsequent adjustment and checking of prestressing forces throughout the life of the structure;
- corrosion protection;
- fire protection.

Additional prestressing may be combined with other techniques such as Carbon Fibre Fabrics (TFC®) or shotcrete, to perform restructuring work in a wide variety of situations.

Our specialist teams can work with you to guide you in analysing your problems or modernization projects.