Repair
Foreva
by Freyssinet

# Historic buildings

FREYSSINET

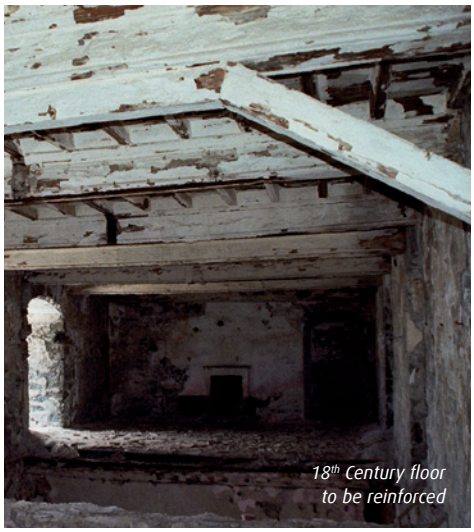
# The problems

**Whether constructed in timber, stone, brickwork or concrete, a building undergoes changes over the course of time. Freyssinet offers proven solutions for the repair, reinforcement and protection of these structures.**

*Curved vaulted timber frame weakened tie beams*

*Damage to structural timber*





*18th Century floor to be reinforced*

*Preserving ruins*

*Rot*

*Spalled concrete, corroded steel and carbonation*

*Shifts in masonry structure*

## Areas of application

- Any building with stability problems or needing reinforcement.

## Problems identified

- Cracks, excessive deformation, partial destruction or breaking of elements
- Timber: rot, peeling, splitting, ring shake, cavities, missing sections, broken joints
- Glued-laminated timber: rot, peeling, undersized sections
- Masonry: repointing needed, dislocation, instability, missing mortar
- Reinforced concrete: corrosion of reinforcements, flaking, spalling, leaching, peeling

## Natural causes

- Aging of materials, chemical attack, freeze/thaw cycles
- Timber: excessive humidity, decay caused by insects or fungi, sun damage (UV)
- Masonry: shifts in soil structure, inadequate stress distribution, leaching of masonry
- Concrete: chlorination, carbonation, water infiltration

## Structural causes

- Change of use, changes in regulations
- Design error, poor design or implementation
- Material fatigue
- Shifts in masonry structure

## Accidental causes

- Variable loads
- Ground movements
- Fire
- Earth tremors

**With sixty years of experience, Freyssinet, general contractor for special works, provides, with Foreva®, your guarantee of a turnkey solution for lasting rehabilitation of your structures.**


*Grouting of masonry and installing tie-rods*


*Underpinning work at the Louvre*


*Wall tying using composite rods*


*Floor reinforcement with compression flange*


*Reinforcing a structure using a mounted foundation plate*


*Reconstituted and treated concrete*

# Our solutions

**Foreva® solutions enable Freyssinet to carry out rehabilitation work in line with industry standards and good practice while respecting the environment.**

## Feasibility study

## Execution methods

## Works

### Repair and reinforcement of wooden structures

- Repair of cracked or broken sections using a seaming technique (**Foreva® Wood Reconnect**)
- Restoration of peeling glued-laminated timber using a remeshing technique (**Foreva® Wood Glulam**)
- Repair of timber frame supports using scarf joints (**Foreva® Wood Scarf**)
- Repair of structural beams using tying techniques (**Foreva® Wood Splint**)
- Restructuring timber framed walls and structural members (**Foreva® Wood Frame**)
- Beam reinforcement by connection of a polymer concrete compression flange (**Foreva® Wood Inertia SUP**)
- Beam reinforcement by connection of a mounted timber foundation plate (**Foreva® Wood Inertia INF**)
- Reinforcement of zones subject to tensile forces using bonded carbon fibre composite (**Foreva® Wood Fabric**)
- Increasing the bearing capacity of a floor by laying a self supporting floor plate (**Foreva® Wood Floor**)
- Additional prestressing (Freyssinet System)

### Repair and reinforcement of brickwork and stone buildings

- Wall tying using composite glass or carbon fibre rods (**Foreva® Stone RFG** and **Foreva® Stone RFC**)
- Repointing masonry
- Surface treatment, remineralisation
- Bracing masonry arches with composite reinforcement
- Restoring the thrust lines in arches (Freyssinet Flat Jack)
- Surface prestressing (Freyssinet System)
- Underpinning work

### Repair and reinforcement of concrete structures

- Realkalisation of coatings by electrochemical repair (**Foreva® $PH^+$**)
- Chloride extraction work on coatings by electrochemical repair (**Foreva® $Cl^-$**)
- Crack grouting (**Foreva® TF Inject**)
- Surface treatment

**Our specialist teams are on hand to help you identify the Foreva® solution to meet your requirements.**

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