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Company

A leading Spanish company

Tecpresa started as **Procedimientos Barredo**, a pioneer company in the Post-tensioning activities in Spain, which started its operations in 1957.

Tecpresa is a leading Spanish company that has achieved its success thanks to its highly qualified staff.

The vast experience of Tecpresa in the post-tensioning market and the loyalty of its customers to the solutions offered, have led us to a major diversification in the sector of special construction activities, including:

- Stay Cables.
- Incremental Launching Bridges.
- Heavy Lifting.
- Road and Railway Underpass Jacking Solutions.
- Ground anchors.
- Acoustic engineering.

Tecpresa's main customers include Construction companies and Project offices, which can benefit from the following competitive advantages offered by the Company:

- The Company has one of the most experienced technical teams in the market.
- Tecpresa boasts the ability to react quickly, thanks to its own Manufacturing infrastructure.
- We offer the study of tailored solutions for each project.
- Tecpresa plays an Active role in the design and drafting of National and European regulations.
- Continuous technical and practical training of its staff.

The business philosophy of Tecpresa is based on its commitment to:

- The Quality of its products and services.
- The Safety of its processes.
- Its Customer Service.
- Its Added value services.
- Constant Research, Development and Innovation.

The staff of Tecpresa is composed of qualified engineers who share this approach, thus establishing the key to the success, reliability, guarantees and expansion of the activities of TECPRESA.

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Post-Tensioning in structures

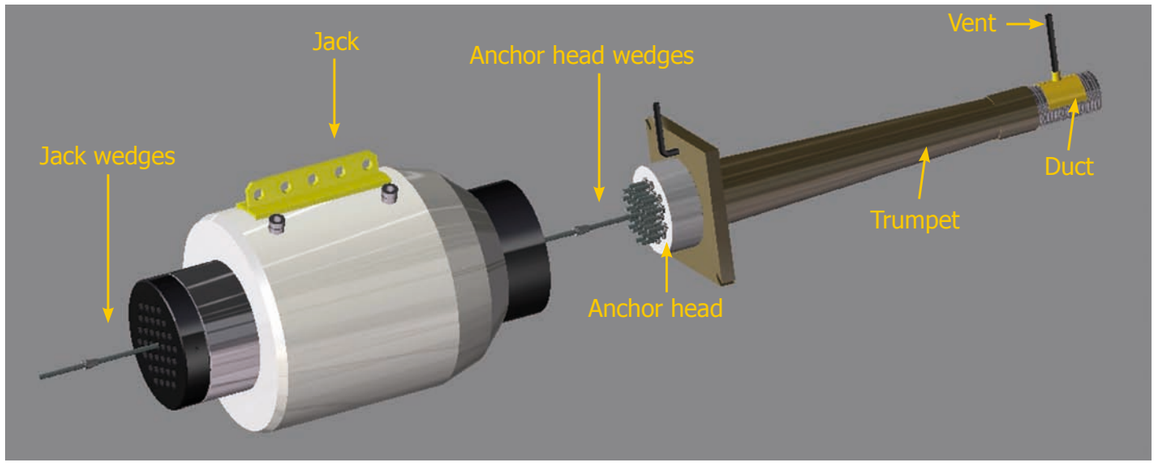
Installation of bearing plates and ducts

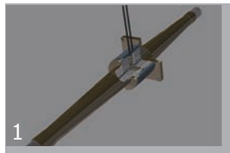
The bearing plates are anchored to the formwork structure with boxes, in order to guarantee the correct alignment of active frameworks during start-up, leaving the minimum clearance dimensions needed to insert the hydraulic jack after the formwork removal operations. Ducts and steel fixings are installed at the same time.

Said operations comply with the specifications described on the plans, supporting these elements on the passive framework every 1 or 2 metres, depending on the complexity of the layout and the unit used.

Joint coupler are used to fix ducts. Said joints will be sealed with tape to prevent grout from being poured inside during the concrete pouring operations.

Special parts (vents) are installed on the highest points, which include a plastic tube that allows the discharge of air to the exterior during the injection operations, to make sure that there are no air-locks inside the duct.

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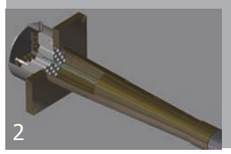
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1. Coupler
2. Passive anchors

Strand threading

This operation is carried out before the concrete pouring operations, in order to prevent the risk of potential dents or cracks on the duct during such operations, which would prevent the execution of the threading operations.

After assembling the coil on the strand, the reel will be aligned with the alignment unit.

A bullet-shaped metallic piece will be installed on the edge of each wire to avoid any deflection effects and from damaging the duct.

Tecpresa expert will thread the strands used in the project along the length, as required for the subsequent tensioning operations.

Tensioning of the tendon

After the concrete pouring and formwork removal operations, one of Tecpresa's experts will install the anchor heads and wedges.

The tensioning process starts when the adequate concrete resistance value has been reached, with the corresponding compression test confirmation. Said situation will be reported by the Site Management Area to Tecpresas expert.

The tensioning process will be carried out in compliance with the instructions of the tensioning program that has been designed and drafted at the offices of Tecpresa, including the following:

- Partial tensioning stages
- Tensioning order in each stage
- Anchor tension in each tendon

During the tensioning operations, the expert will record the different load steps and elongation that has taken place during the operation on the corresponding report.

The measurement equipment will be adequately calibrated. Likewise, elongations will be measured with a minimum precision of 2% of the total length.

Cutting edges and sealing boxes

After the completion of the tensioning operations and once the elongations have been checked, the corresponding supervisor will give the instructions to cut the tensioning edges with a radial saw, 3 cm from the edge of the wedges. The boxes will then be sealed with a non-shrink grout.

The tubes used for the injection will be placed before sealing the boxes, connecting them to the openings on the bearing plates.

Grouting

The conduits are washed with water before the injection process, which will eliminate all water-soluble oils during the thread operations and it will also discharge the remaining water injected with compressed air. In case no oils have been used, the cleaning operations can be carried out with injected air.

The injected grout has the following composition: 100 Kg of cement, TYPE I, 40 to 43 l of water and 450 g of additives.

In addition, the cleaning operations can be used to detect obstructions and communications between ducts or between ducts and recesses.

The grout injection process requires the use of a 3 to 5 m3 per hour capacity grout injector, with a double mixer, designed so as to prevent any interruptions during the operations.


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1. Strand pusher
2. Tensioning Operation Detail
3. Grout Injector Detail

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Post-Tensioning in bridges built in formworks

Nowadays, most Civil Engineering works have plenty of structures, such as overpasses and underpasses, which are usually executed on formwork.

The use of Post-Tensioning techniques is crucial for the construction of this type of structures which are built on site with the following main advantages:

- Reduced costs
- Larger spans
- Smaller deck depths
- Elimination of joints
- Greater durability

These structures can be executed in one or several phases, depending on their length.

Tecpresa offers many different solutions that cover all post-tensioning requirements for this type of structures:

- Anchors, from 1 to 37, 0.6
- Continuity anchors
- Active and Passive Anchors
- Vertical and horizontal tendons used to join abutments
- Adjustable anchors
- Cement, wax or grease grout injections

Civil Engineering works have plenty of structures

Andoma Viaduct

1. Segarra Garrigues Aqueduct
2. A-8 Lorenzana Villamar Overpasses
3. Apotzaga Viaduct
4. Overpasses North Zamora Ring Road
5. HSR Valdestillas Viaduct

Post-Tensioning

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Post-Tensioning in bridges in self-launching formworks


Laxe Viaduct. Lalin-Lalin HSR


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1. Huerta de Mateo Viaduct. Minglanilla HSR
2. Almocaizar Viaduct
3. Las Pedrizas Viaduct
4. High-speed Rail. Álora-Cartama
5. Isla de Arosa Viaduct


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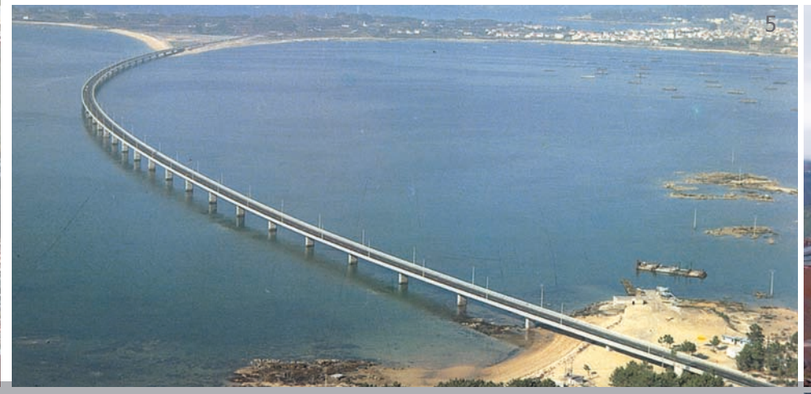
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Nowadays, Civil Works viaducts are built with larger spans and at greater heights.

Therefore, the construction techniques have been improved with the use of Self-launching Formwork Structures, Launching Carriers or Launching Techniques.

The coordination of the post-tensioning works (alignment, tensioning and grouting) with the rest of the activities is crucial in this type of constructive method, since any delay or failure in the execution would lead to important delays in the weekly schedule.

In order to comply with or even improve the weekly progress, Tecpresa offers detailed procedures for an optimal and faster execution.

Post-Tensioning

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Post-Tensioning of precast segment viaducts

Marin Viaduct. Arlaban Temporary Consortium

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1. Arade River Viaduct
2. Barranco de la Batalla
3. Adeje-Santiago Viaduct
4. Mazmela Viaduct
5. Scut Azores

Tecpresa is the most experienced company in the precast segment bridges execution.

This type of viaduct has a deck built in segments of approximately 2.4 m, which are then set with the launching carrier.

The sections start being placed on the pile section and advance in a T-shaped projection until they meet the corresponding T-shaped projection of the next pile.

Logically, segments are joined with post-tensioning operations. Sometimes, the second phase Pre-tensioning operations are available, in order to facilitate the performance of the launching operations, which will be responsible for absorbing the service loads.

The execution of tensioning operations for this type of viaducts is highly complex, as a result of the following:

- Post-tensioning is regarded as the critical path to launch the next section or segment. This is how 10 Segments have been launched per launcher and per day.
- The space is limited for the execution of tensioning operations on viaducts with a variable depth, which can be less than 1.20 ml. Therefore, Tecpresa has developed special tools to attain a high performance in highly reduced spaces.
- The hazards involved in working close to a free fall area.

Post-Tensioning

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Post-tensioning in balanced cantilever viaduct

Montabliz Viaduct. Cantabria-Meseta Highway. Section Pesquera-Molledo

1. Ergobia Viaduct
2. Despe-te que Suas Viaduct. Scut Azores
3. Montabliz Viaduct
4. Pujayo Viaduct
5. A66 Viaduct. Bejar
6. Scut Azores

This method is based on carriage formwork travelers which advance symmetrically from the pier in segments between 3-10 meters in length.

This method is used in viaducts with long spans where the use of other methods is impossible.

Tecpresa has built among others the Pujayo and Montabliz Viaducts in the Cantabria-Meseta Highway. Section Pesquera-Molledo.

The Montabliz Viaduct has not only one of the tallest piers in Spain but is also the longest span.

The cantilever segment have a length of 10 ml and it has post-tension tendon of 31 strand and 162 meters length.

Tecpresa has carried out the Despe-te que Suas Viaduct in the Azores Viascut with a main free spam of 185 m.

Tecpresa has executed these projects with all the necessary means to achieve more than a segment per week and per pier.

Post-Tensioning

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Post-Tensioning in special structures

The use of Post-tensioning operations is vital in the construction of special structures, such as:

- Water tanks
- Waste water digesters
- Silos
- Liquefied Gas Tanks
- Nuclear Power Plants
- Telecommunications Towers
- Chimneys

These structures require a strict quality control process and a perfect execution.

1. La Gavia Waste Water Treatment Plant
2. Details of the Post-Tensioning Boxes in the Pier of a Silo
3. Silo. Azuara
4. Water Reservoir
5. Clinker Silo. Castillejo
6. Clinker Silo. Málaga

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Post-tensioning operations in building works

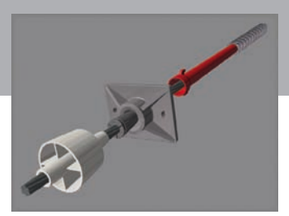
The use of Post-Tensioning Operations in Building Works offers the following advantages:

- Costs savings
- Greater open spaces
- Greater distance between pillars
- Smaller slab depths
- Less number of joints
- Control of deflections
- Smaller foundation structures
- Greater durability

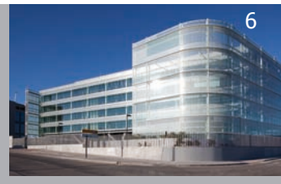
Tecpresa has carried out the post-tensioning operations of many slabs in different types of special projects and buildings:

- Shopping Centres
- Hotels
- Theatres
- Conference Centres
- Train Stations
- Airports
- Universities

Tecpresa has used different solutions in these projects, such as its non-adherent single-strand systems, its 31 0.6 tendons or 4 0.6 units with plain duct.



1. Caixa Forum Headquarters
2. Alcorcón Centre for Creation of the Arts (CREAA)
3. Herederos Marqués de Riscal Hotel
4. Ifema New Pavilions
5. Fortuny building
6. Ebrosa
7. Canal Theatre



Post-Tensioning

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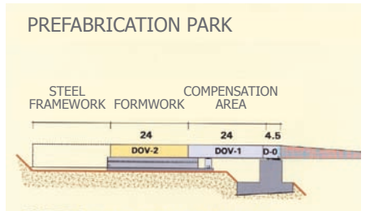
Incremental launching bridges

Launching process

This is a deck construction process that involves the manufacture of deck sections (segments) in a fixed location (Manufacturing Park). Each section is then launched with hydraulic jacks passing through the top of the piers with special support elements.

This process is repeated as many times as the number of deck segments or sections, fixing them together with the post-tensioning operations.

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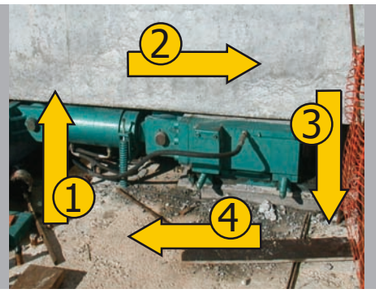
Launching equipment

The launching equipment includes horizontal and vertical hydraulic jacks, so that the movement takes place in four phases, whereby the vertical jack lifts the platforms load and it is then pushed by the horizontal jack to move the platform forward. After covering approximately 20 cm, the vertical jack is lowered and the horizontal jack is retracted, repeating the cycle.

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1. Fuentes del Ebro Viaduct
2. Papiol Viaduct
3. San Julián Viaduct
4. Gineta Viaduct
5. Duero Viaduct
6. Vinaixa Viaduct
7. Motilla Viaduct


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Launching

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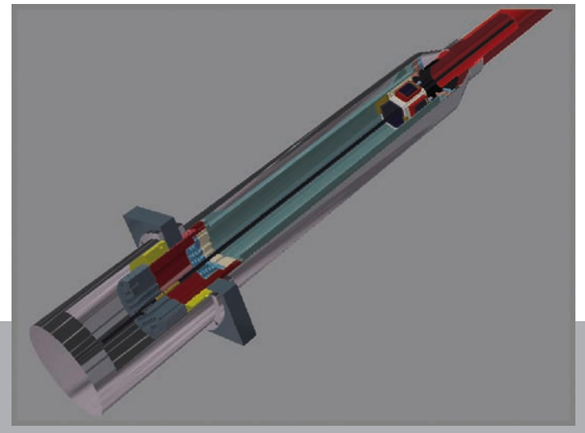
Cable-Stayed Bridges

Tecpresa is a specialist in the execution of stay cable structures.

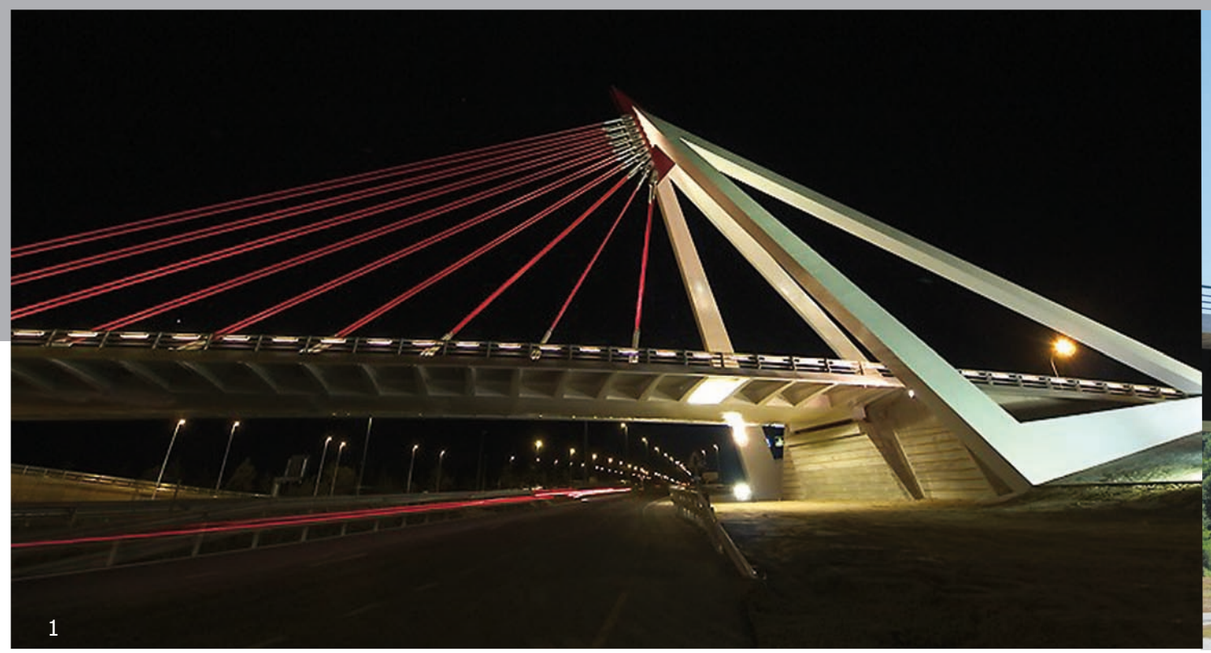
Tecpresa System consists of tendons composed of strands with up to 4 different protective anti-corrosion coats.

The stays can be installed strand by strand or prefabricated.

The Tecpresa System has been tested under the requirements of FIB, PTI and SETRA Recommendations among others.



1. Las Rozas Bridge
2. Lamas stay cabled Arch in the Lalin-Lalin high speed railway (Galicia)
3. Arriaca Bridge
4. Los Tilos Arch
5. Ocaña La Roda
6. Ricobayo Arch



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Stays

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Lock coil and bar structures

Tecpresa has a wide experience in projects using locked coil ropes and Bars as alternative to the strand system.

The scope of application ranges from small footbridge to big viaducts.

Both systems have the following advantages:

- Less time of execution.
- Smaller auxiliary means.
- Smaller measures of their components.

In order to improve the behavior against corrosion in the bar system it could be use:

- Stainless steel bars.
- Galvanized Bars with additional painted coat.
- HDPE external sheet injected with wax.

Vicaria Arch

1. Suspension Pedestrian Bridge Delicias (Zaragoza)
2. Cable-stayed bridge, Fuenlabrada
3. Vicaria Arch
4. Tenerife Bridge

Stays

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Road and railway underpass jacking solutions

The use of traditional systems in the execution of underpasses and structures under railway platforms entails a series of determining factors and additional works that can lead to major inconveniences for railway operations.

The jacking method can be used to build the entire structure away from the railway platform. A simultaneous operation of pushing with hydraulic jacks and excavating through the embankment places the structure on its final position.

This is a very simple method that does not affect the regular railroad operations during the entire duration of the works.


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1. Caisson at initial position
2. Caisson at final position
3. Caisson Soto del Barco (Asturias)


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1. Caisson at M-50
2. Hydraulic jacks
3. Bracing of the Track
4. Launching Equipment
5. Caisson at Morella

Solutions

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Heavy lifting and repairing of structures

1

Tecpresa has the machinery and experience required in all kind of Heavy Lifting movements with hydraulic jacks not only for new projects but also for the repair of existing structures.

Tecpresa designs tailored solutions that meet the different needs of each project.

Tecpresa has used a wide range of systems with the following possibilities among others:

- Single or multiple jacks control at the time.
- Load control.
- Movement control.
- Computerized control systems.

These systems can be used with any load, displacement or jack typology:

- Double acting cylinders.
- Security lock-ring.
- Tilting head cylinder.

1. Broadway bridge. Indiana Toll Road
2. Multipoint pre-stressing of the Barajas Terminal Building façade

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1. Jacking operation in Consejerías de Mérida ledges
2. Consejerías de Mérida
3. Bearings reparation
4. Deck Raising in Bridges in A-2. Calatayud-Alfajarín.
5. Multipoint pre-stressing Barajas Airport
6. Pier removal, clearance increase, extra-dorsal stressing

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Heavy lifting

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Acoustical and vibration engineering


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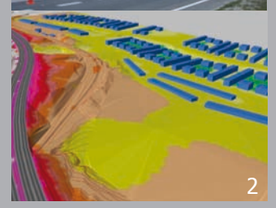
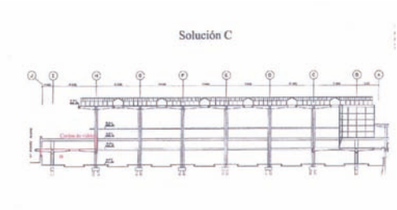

2

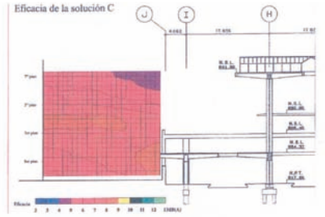
Tecpresa carries out acoustic impact studies and develops methods to reduce or eliminate noise, with the installation of screens that can guarantee the correct mitigation of the impact of noise.

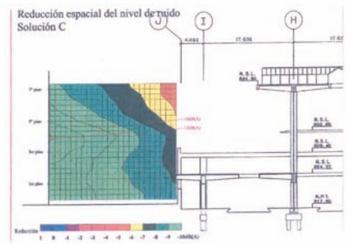
Screens can be:

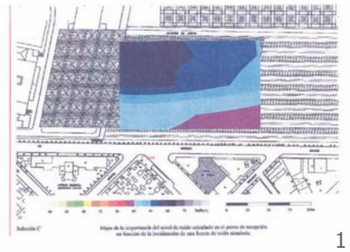
- Absorbent
- Reflecting

1. Installation of Acoustic Screens at M-50
2. Acoustic Study at PAU Arroyo del Fresno (Madrid)
3. Acoustic Screens at Artxanda Tunnels (Bilbao)





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1. Acoustic Study and definition of corrective alternatives at Ave Puerta de Atocha
2. Acoustic Screens SILENT. "Madrid Abierto- ARCO 2004"
3. Acoustic Screen at Arauca Link Road (Portugal)
4. Acoustic Screens at Cervelló Link Road (Barcelona)


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Acoustical

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