Polski Komitet Narodowy Międzynarodowej Rady Ochrony Zabytków ICOMOS

FONDAZIONE ROMUALDO DEL BIANCO

SAPIENZA UNIVERSITÀ DI ROMA

POLITECHNIKA LUBELSKA

UNIVERSIDAD POLITÉCNICA MADRID

SAPERE AUDE VILNIUS GEDIMINAS TECHNICAL UNIVERSITY

FONDAZIONE FLAMINIA RAVENNA

Sustainable Urban Rehabilitation in Europe

Historical building adaptation to modern function

Erasmus+

Sustainable Urban Rehabilitation in Europe

3rd Semester

Susana Mora Alonso-Muñoyerro
Ignacio Mora Moreno
David García García
Carolina Hernández Martínez
Camila Burgos Vargas

Historical building adaptation to modern function

3 ECTS

SH

Sustainable Heritage

EC

Elective Courses

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SURE
SUSTAINABLE URBAN REHABILITATION IN EUROPE

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Sustainable Urban Rehabilitation in Europe

Historical building adaptation to modern function

3 ECTS

SH
Sustainable Heritage

EC
Elective Courses

01 Introduction to building adaptation
02 Typology: big to big & small to small adaptations
03 Typology: big to small & small to big adaptations
04 Programme: extensions
05 Programme: bubbles
06 Programme: other adaptations
07 Circulations: horizontal circulations
08 Circulations: vertical circulations
09 Enclosure: protective enclosure
10 Enclosure: lightweight roofs, façades and finishings
11 Systems: climatization
12 Systems: fire protection, water supply and evacuation
13 Illumination: natural lighting
14 Illumination: artificial lighting
15 Illumination: lighting systems

Sustainable Urban Rehabilitation in Europe

Historical building adaptation to modern function

3 ECTS

LESSON 11 SYSTEMS - CLIMATIZATION

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SURE
SUSTAINABLE URBAN REHABILITATION IN EUROPE

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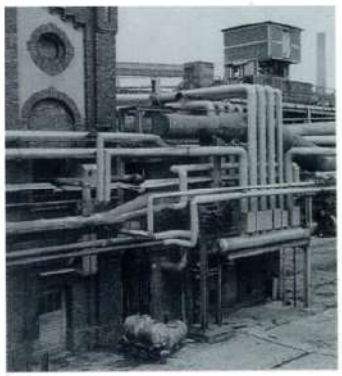
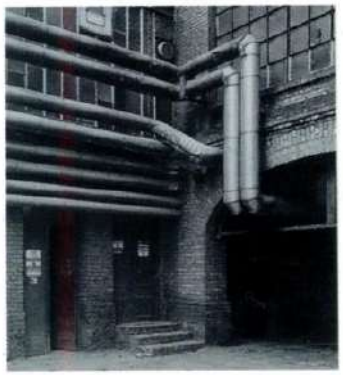
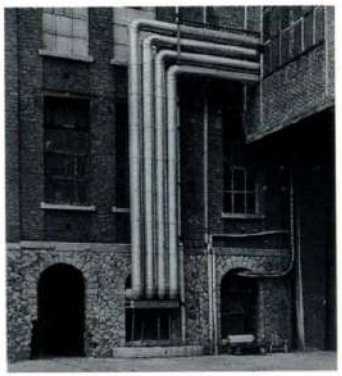
Building installations and architecture


The photographs of Urhan infrastructures and industrial constructions carried out by Band and Hilla Bechev show the formal power that the installations can achieve.

Building installation are all those systems that provide the architecture with the comfort, security and accessibility conditions that it requires. This includes the systems that supply energy and matter to habitable constructions.

Installations in building adaptation

- INCREASE OF COMFORT STANDARDS. The evolution of society has led to an improvement in the quality of life, and an increase in the demands of comfort in our buildings. This is the reason why the reuse of buildings requires an improvement of the facilities, and the implementation of those that lack.
- COMPATIBILITY. In the change of use of a historic building, it should be assessed as an important factor the possibility of implementing the facilities that the new use requires, and the compatibility of these with the values of the construction. The requirements of use must respect the fundamental values of the building; otherwise, other options should be considered

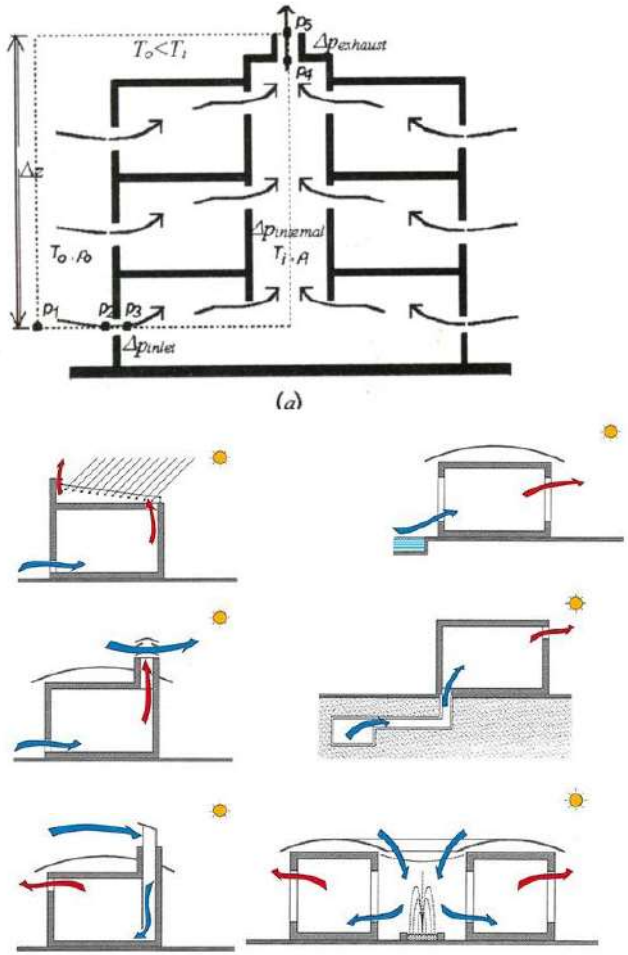
INSTALLATIONS IN BUILDING ADAPTATION

- The most decisive facilities in the construction, given their volume, are those of CLIMATIZATION and those of EVACUATION.
- On the other hand, ILUMINATION facilities are the ones that will allow greater design possibilities, and allow to emphasize the values of the building.
- The other facilities (FIRE PROTECTION, WATER SUPPLY AND EVACUATION, ETC.) are not decisive, but should be taken into consideration.

BUILDING INSTALLATIONS

- **VENTILATION**
- FIRE PROTECTION
- PLUMBING AND DISCHARGE OF WATER
- ELECTRICITY INSTALATION

Ventilation: chimney effect



Chimneys They have traditionally been used as extraction ducts for the renewal of air. and the traditional house ventilates and renews through the conduit of extraction of smoke from the home or the kitchen. since the sucking effect it evokes 'drags' the air from the rest of the space, penetrating the new air by infiltering the enclosures. In those spaces where heat is not generated. the fireplace is activated by Venturi effect causing the suction of the interior air.

We have seen that the chimney effect is the result of the temperature difference between the interior of the building and the surroundings. and that is characterized by the generation of pressures of different sign from a point of neutral pressures located in the upper area of the building. With outside temperatures lower than the interior, the air renovation will penetrate the building through the lower floors. heating up to be evacuated in the upper zone. This effect will be more effective when the nnp –the air will not enter through the gaps located above this elevation. and this one The higher the air vents are, the higher they are and the more spacious be.

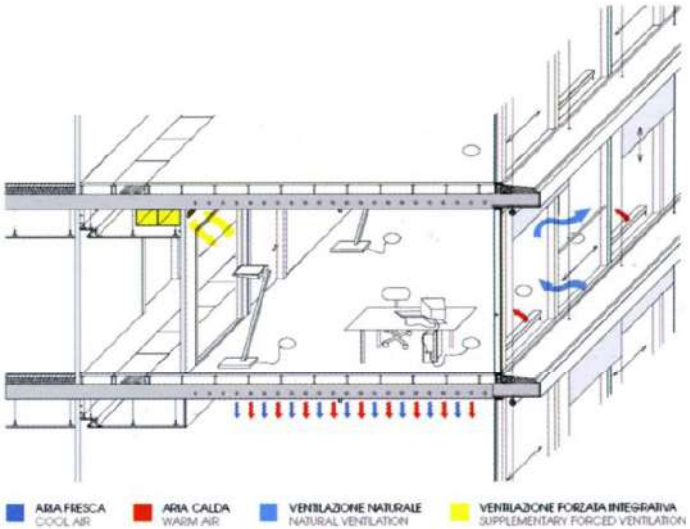
Ventilation and refrigeration

Ventilate has traditionally been used as a cooling system. Some of the traditional mechanisms already cited in popular architecture as ventilation systems are cooling, from the wetted patios with fountains and plants to the wind towers.

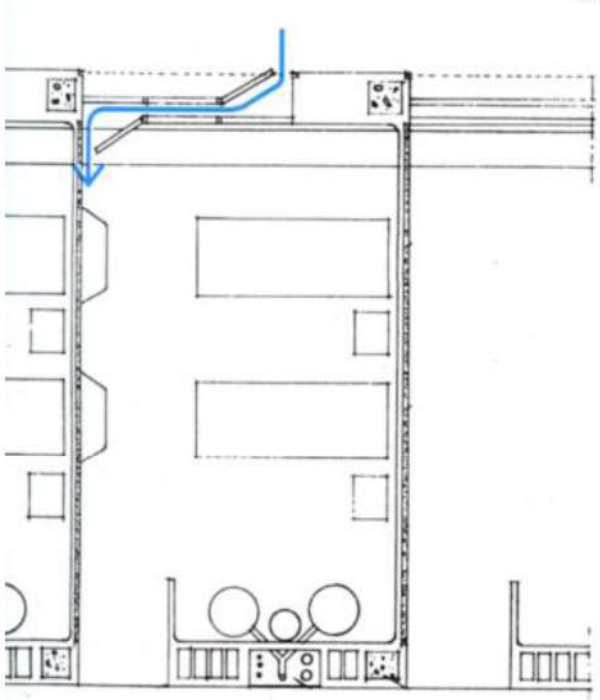
All natural ventilation systems involve some cooling, as the convection generated contributes to dissipate the heat accumulated in the construction, and the speed of the generated current contributes to raise the acceptable temperature. In this sense, mixed systems based on the chimney effect will be the most efficient, but this effect is no longer significant as the outdoor temperature increases.

The most widespread ventilation cooling technique is the night cooling. Its foundation is the nocturnal descent of the temperatures. so that, if we achieve a high rate of air circulation through the building, it will yield by convection the accumulated heat during the day. The next day the cycle resumes. With the building cooled it can act again as a heat sink.

To be efficient, a certain mass of construction is required, the capacity to accumulate heat is basically proportional to the mass - so that the building has a high "time constant" - thermal capacity by accumulation.



Ventilation and air-heating

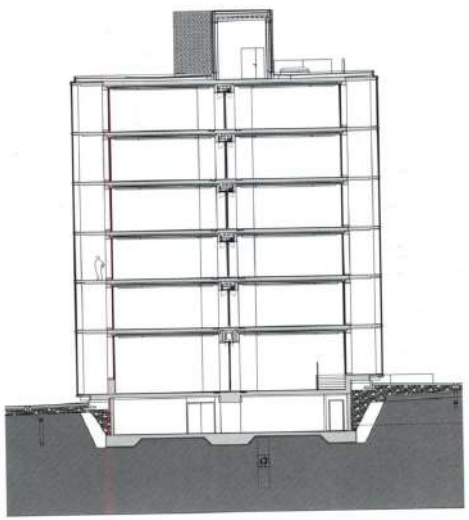


Alvar Aalto, Paimio Sanatory, Finland, 1933. Rooms were ventilated throw a double carpentry windows with an upper casement window.

Ventilation and air conditioning system

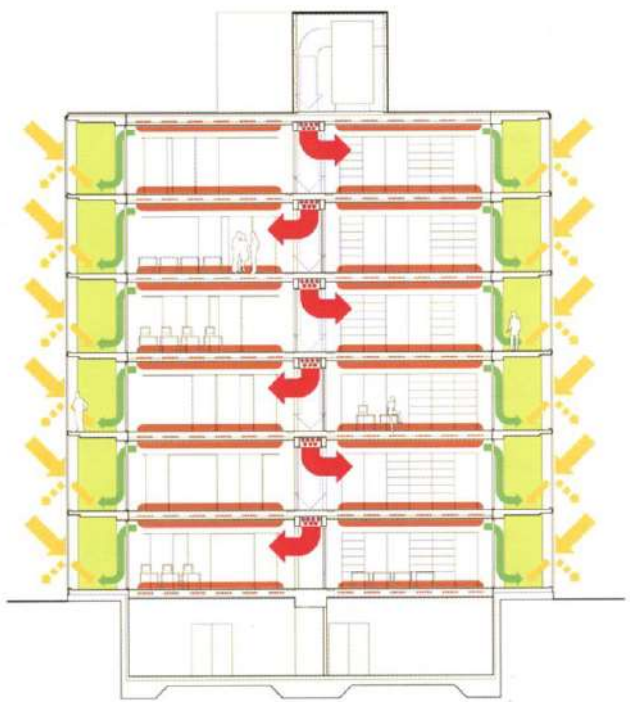
Vocational school in Baden, Switzerland

Burkard-Meyer

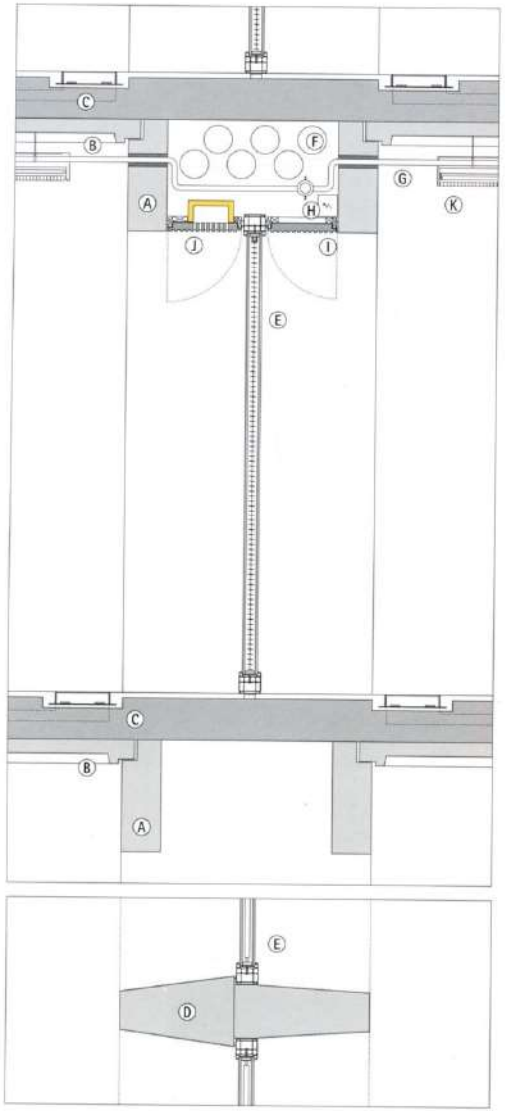


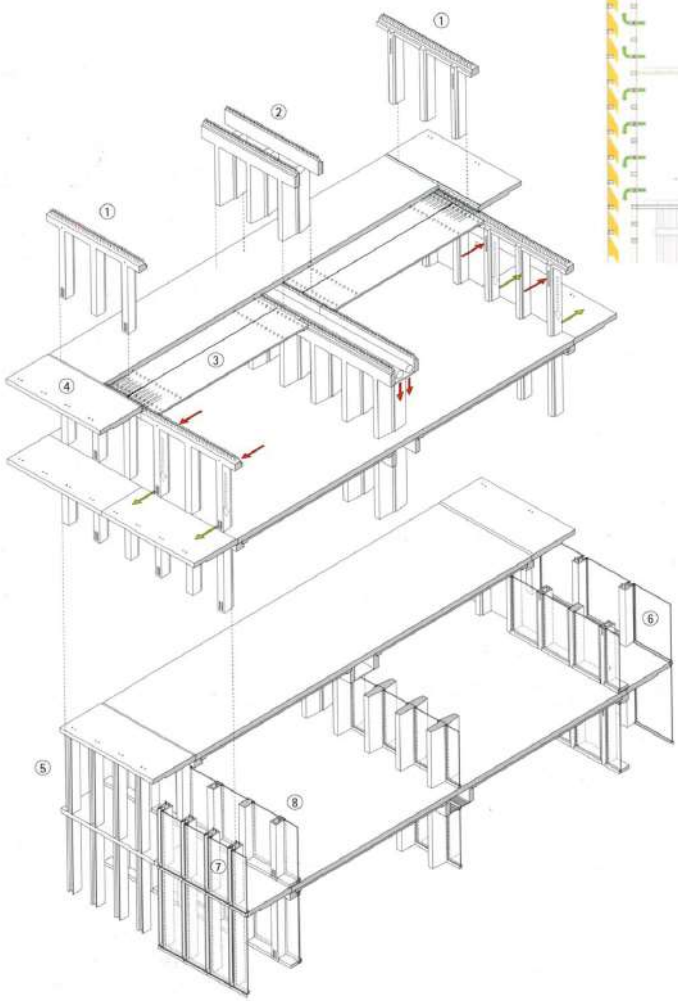
Sistema de climatización:

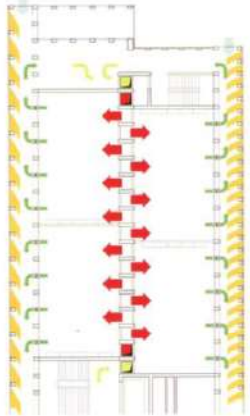
- Soleamiento directo.
- Impulsión de aire frío o caliente.
- Retorno.
- Sistema de componentes termoactivos, con circulación de agua caliente o fría.
- Ventilación natural de los corredores para el enfriamiento nocturno en verano.



SYSTEMS - CLIMATIZATION



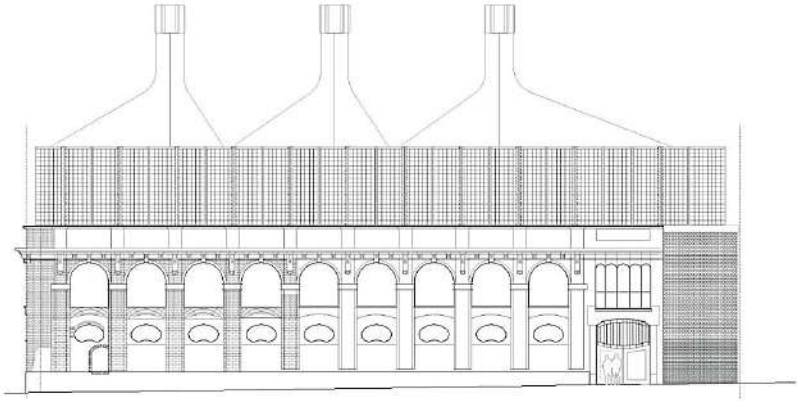


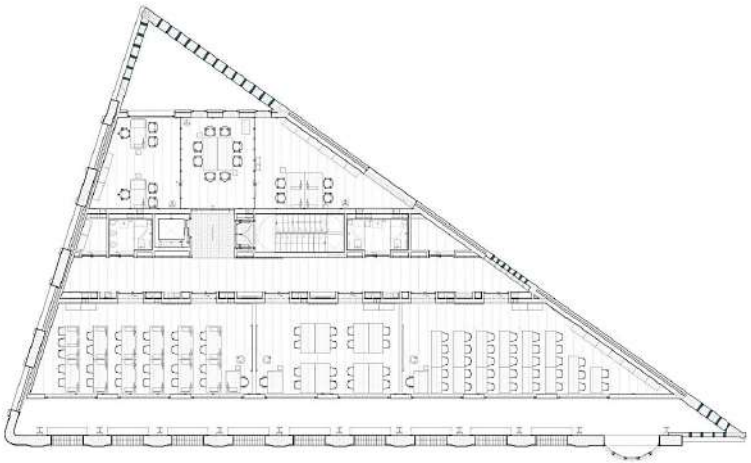


Ventilation and air conditioning system

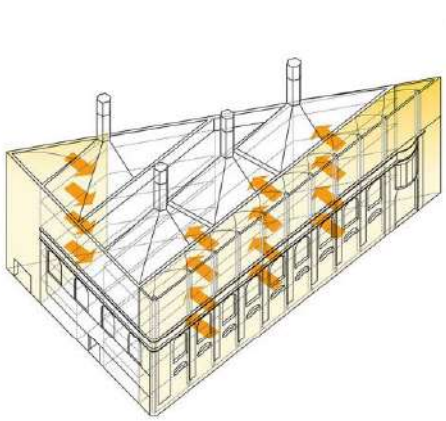
Glass shop Planell Civic Centre.

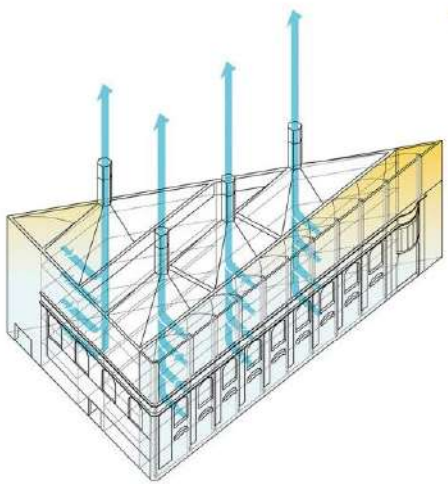
Les Corts, Barcelona, Spain. 2016. Harquitectes

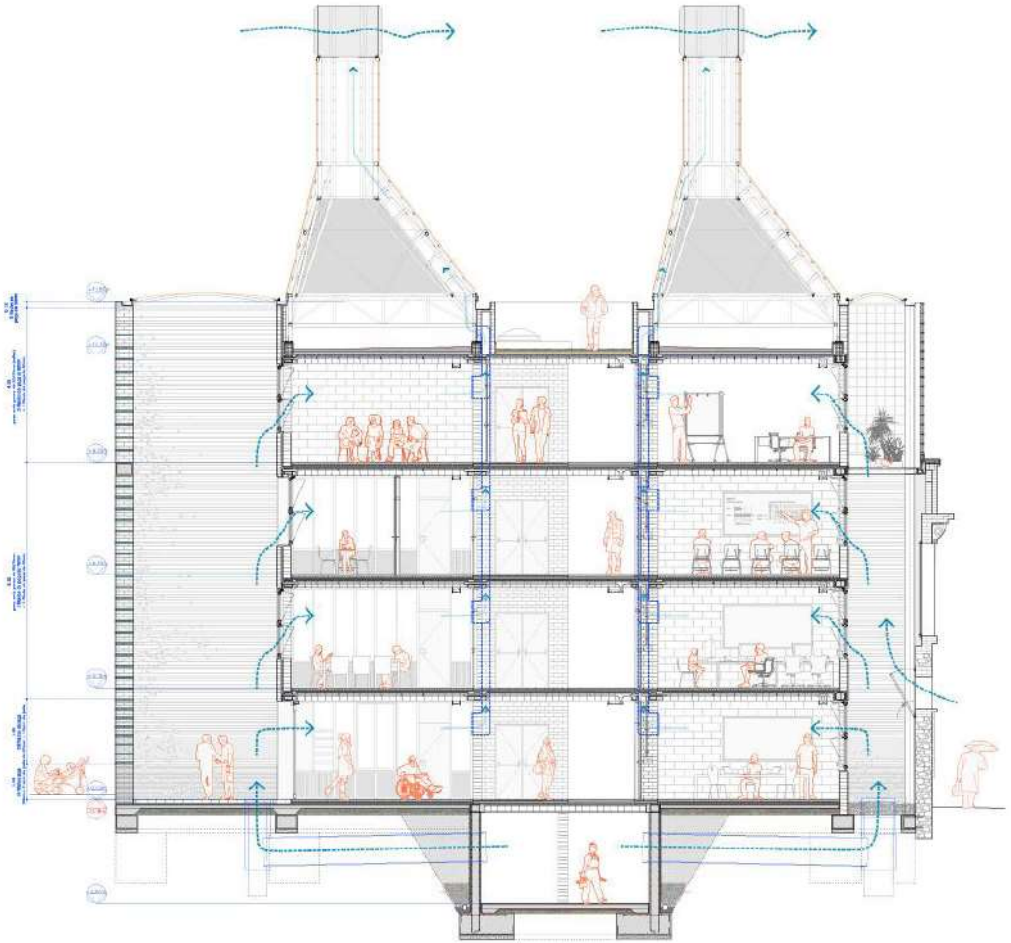




SYSTEMS - CLIMATIZATION





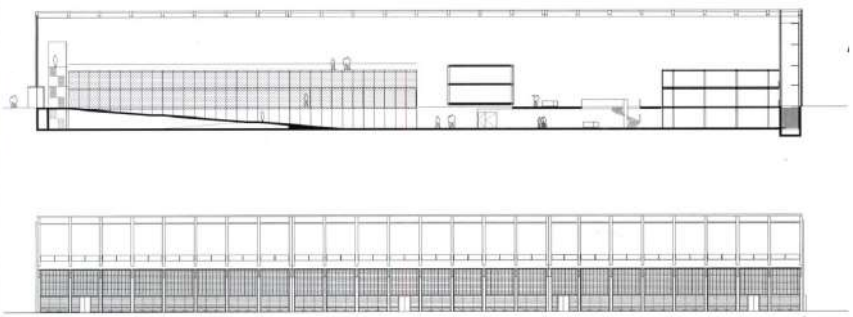


Ventilation and air conditioning system

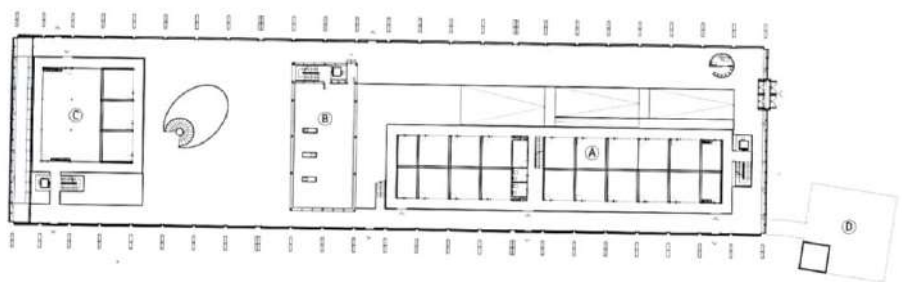
Embarcadero industrial warehouse rehabilitation

Cáceres, Extremadura, Spain.

Nieto Sobejano Architects



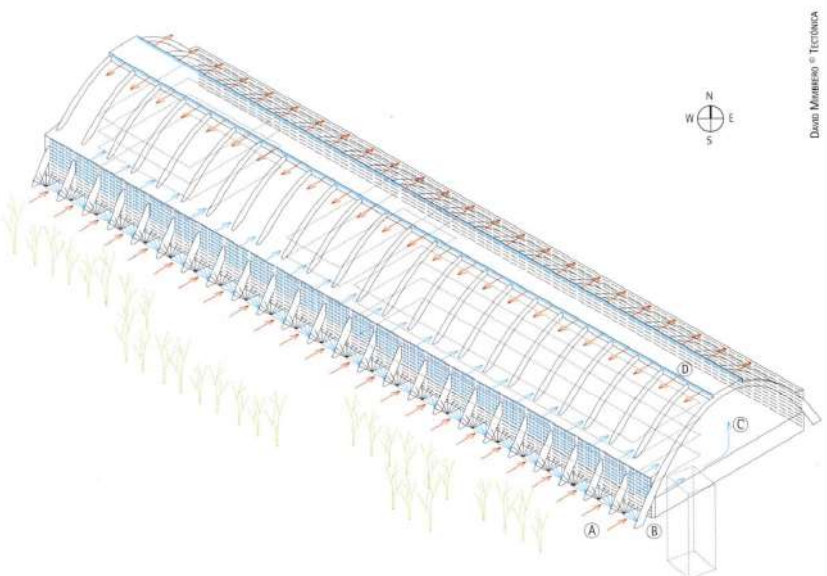
Sección longitudinal y alzado suroeste



Climatization of interior space

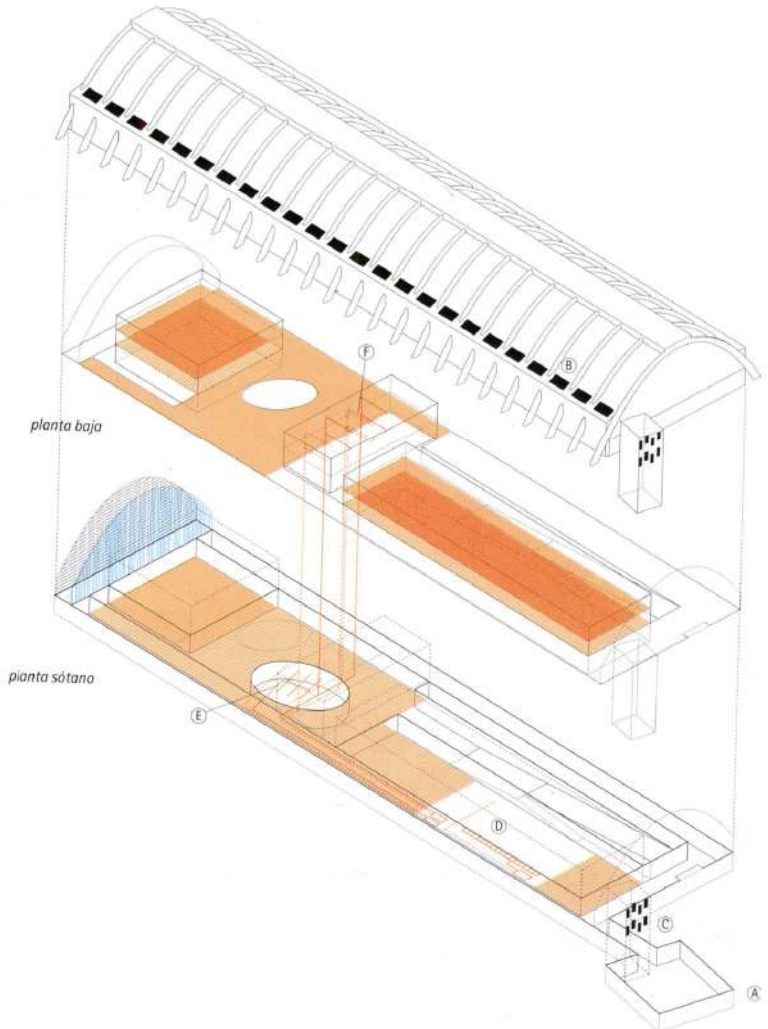
Conceived as a means for environmental education and dissemination, the building adopts natural ventilation systems based on the use of non-polluting natural resources, which reduce the consumption of conventional energies for indoor air conditioning.

These systems are based fundamentally on two concepts. On the one hand, the conception of the totality of the envelope of the building as an element for capturing and exchanging energy with the exterior, which is produced when the natural circulation of the air by convection and favouring The greenhouse effect. On the other hand, the consideration of the interior space as an accumulating mass of energy by thermal inertia, to which the underground excavation of the basement contributes, extending the temperature gradient between the underground part and the upper part of the vault.



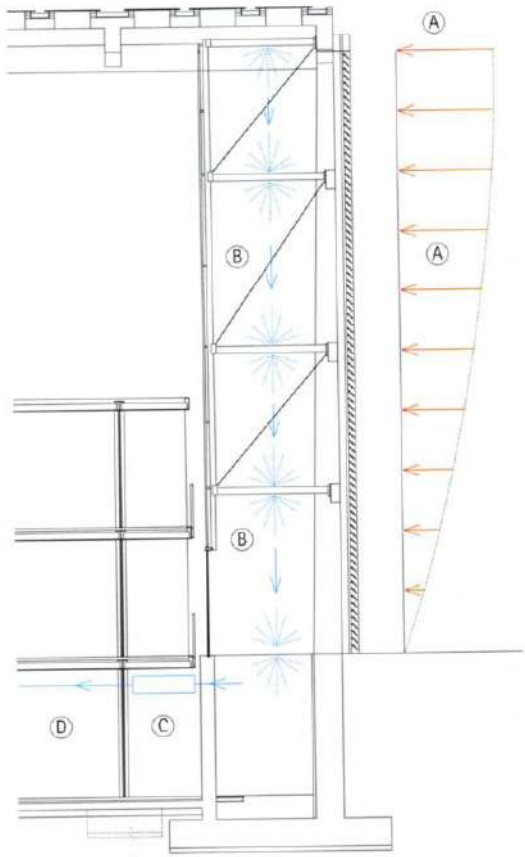
Ventilation and air conditioning system

The building has conventional systems for air conditioning installations, underfloor heating, domestic hot water production and artificial lighting. The volumes of the auditorium, library and cybercafé have individual air conditioners that allow independent operation of each of the zones, to ensure flexibility of use. Meanwhile, the volume of training, offices and the environmental building have underfloor heating. The climate controllers and the ventilation units are housed in the basement floor, in the longitudinal side tunnels. The room for boilers, pumps and chillers serving the floor heating and air conditioners are located in the basement of the annex building. This building, which emerges as a tower, is proposed not only as a visual milestone of the action from the urban point of view, but as an icon that identifies its environmental character.

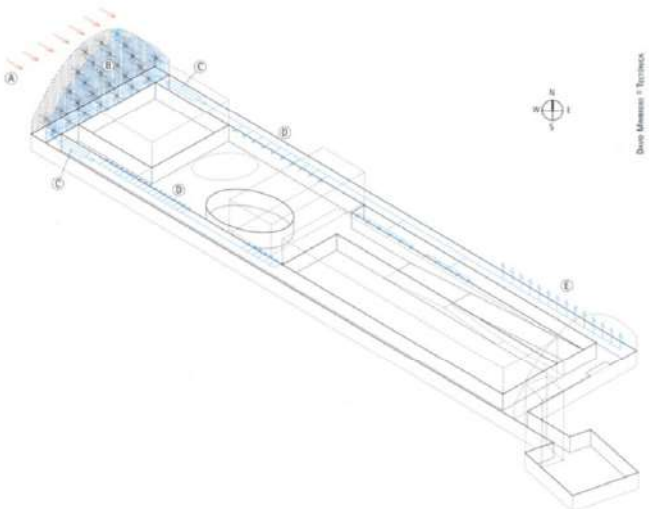


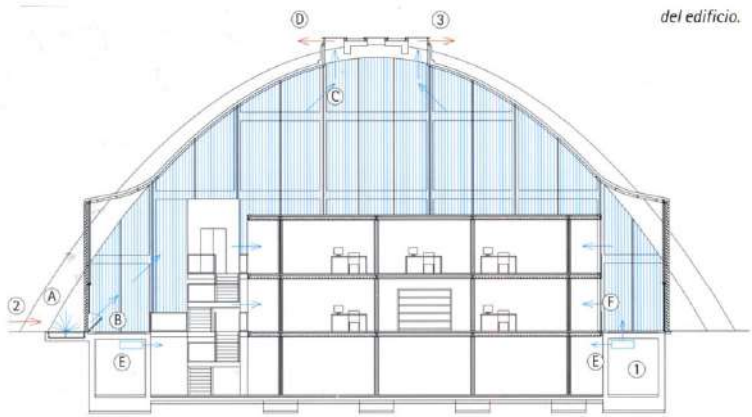
Solar chimney of the northwest facade and sub-terrestrial wind tunnels

Taking advantage of its height and oriented in the direction of prevailing winds in the area, the northwest façade takes a chamber bounded by an air-permeable outer layer of adjustable metal slats and an interior polycarbonate enclosure. A metallic substructure that separates both layers supports a dense network of water sprayers arranged in all the heights of the façade. In this saturation chamber, the incoming air is cooled by evaporation, and follows a downward vertical movement as its temperature decreases and its humidity increases. In the lower part of the chamber, a forced extraction system is located, with fans that drive the air to the ducts that run along the two underground tunnels located under the longitudinal facades. These ducts end in recessed nozzles that provide fresh air for the natural air conditioning of the basement.



Ventilation grilles



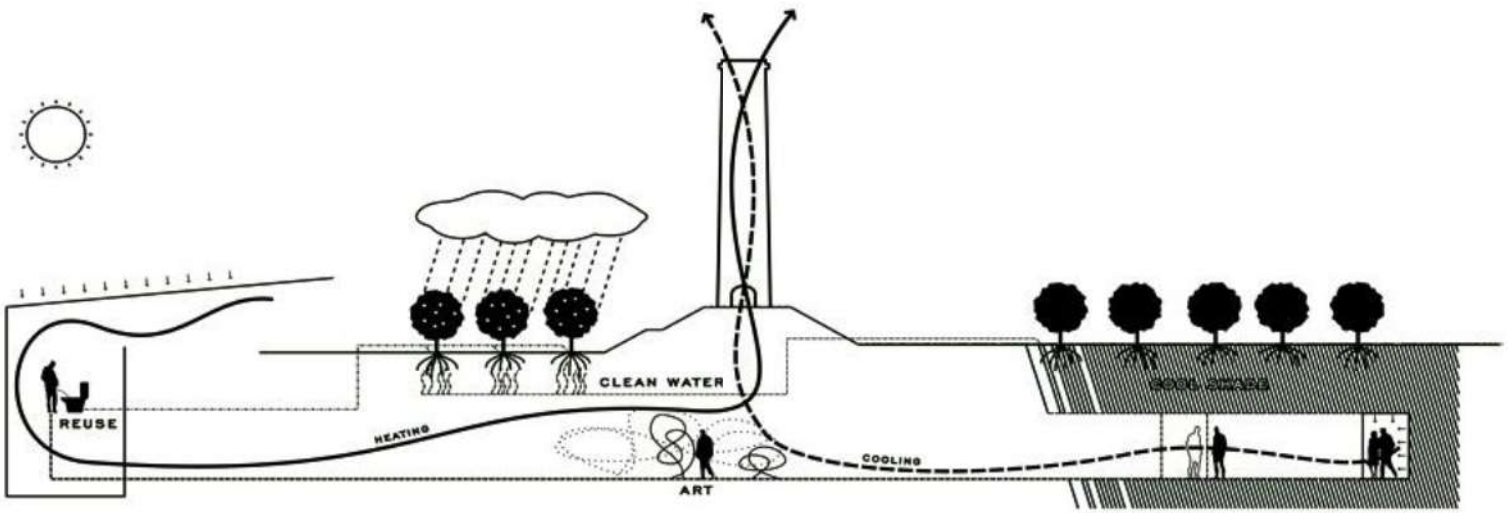


del edificio.

Ventilation and air conditioning system

Inujima Art Project-Seirensho, Okayama

Converting a century-old copper refinery into an art gallery complex

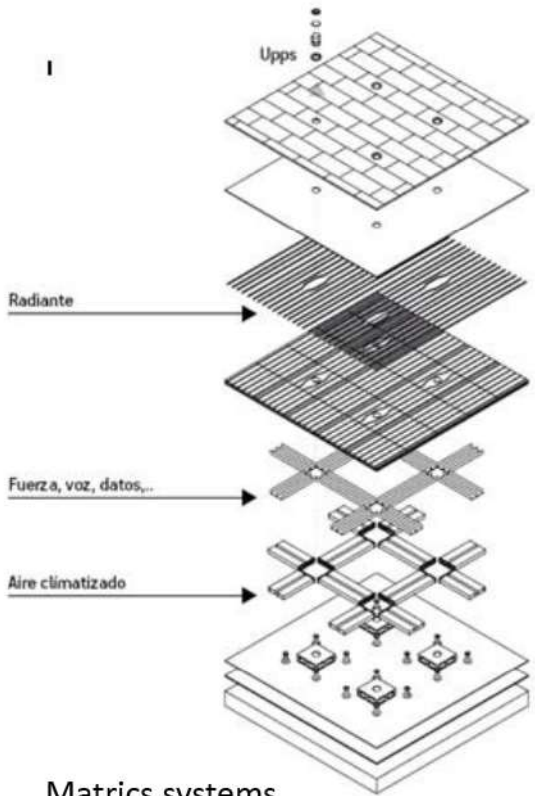


INUJIMA SEIRENSHO ART MUSEUM © SAMBUICHI ARCHITECTS
Fukutake Foundation

Ventilation and air conditioning system

Cava-La Fassina Museum in Sant Sadurní d'Anoia, Barcelona.

Ozcáriz-Lindstrom Arquitectes



Matrics systems

Floor Matrics completed with the grid of knots ready to receive technical services. The final finish is natural stone with dry system "clickandstone" that has four grooved edges to accommodate the PVC joints that fix the tiles together.

SYSTEMS - CLIMATIZATION

The state of the building forced to dismantle the entire roof, it was rebuilt with new materials.

In this case, the floors of the rooms were regularized with a traditional concrete slab.

The grid of technical galleries is observed; air ducts (35 x 16 cm, in this case) touching the hearth and the cable trays just above.

On top, the base of the screed is placed with the adjustable feet. This base is formed by a Fermacell high density board (25 mm). The reserves are observed so that the technical knots can be accessible.

SYSTEMS - CLIMATIZATION

SYSTEMS - CLIMATIZATION

On this basis the radiant floor is placed and additionally in this case the fancoil type support exchangers are installed a cake of the large windows that were closed with glass.

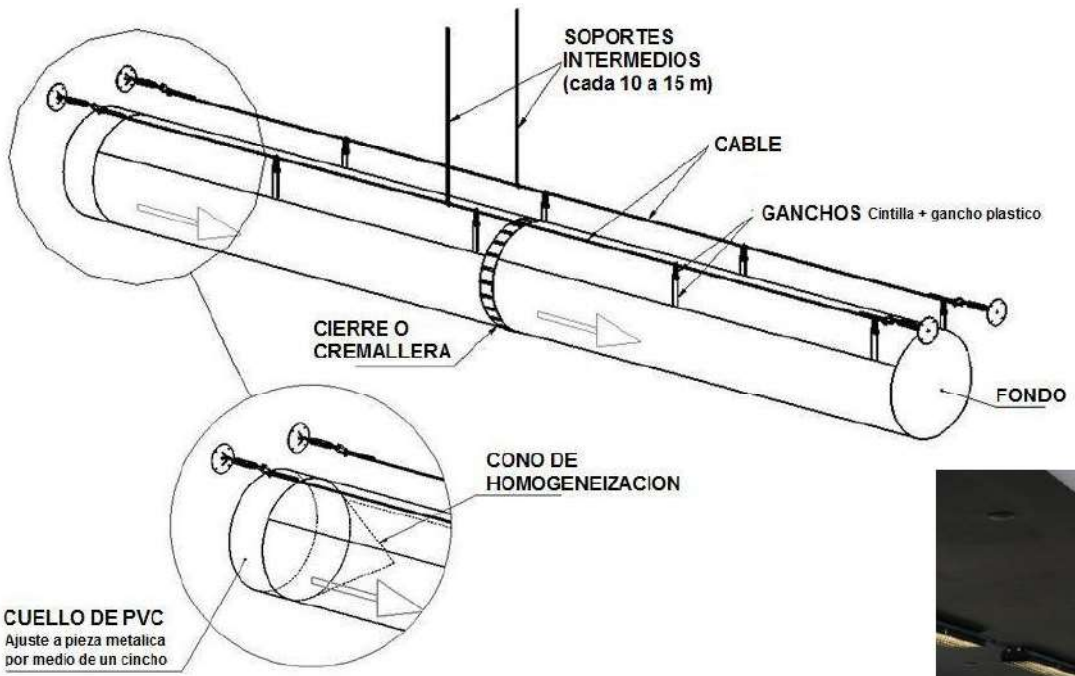
The Matrics floor in operation. You see a renewal air distribution knot; in summer they radiate cold air and in hot winter. The remaining knots are free to offer the technical services of the museum, illuminate the elements in the center of the room and carry voice / data. It should be noted how the projections on the walls are free of weather conduits.

TEXTILE DUCTS

The textile ducts are an economical and very efficient solution for air distribution. They come in various configurations and types of distribution to adapt to different needs.
They allow the continuous diffusion of air throughout the duct, they are very light, easy to install, modular, washable, customizable and can be installed up to a height of 30 m.

- Continuous air diffusion.
- Fire resistant.
- Washable.
- Easy and quick installation.
- Customizable.

TEXTILE DUCTS



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