Category : Sustainable construction of cultural building

Case study : Mazan community hall

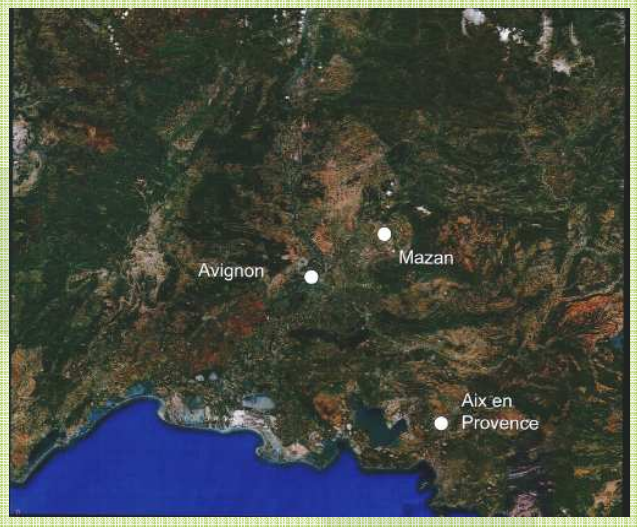
Project cofinanced by
European Regional Development Fund

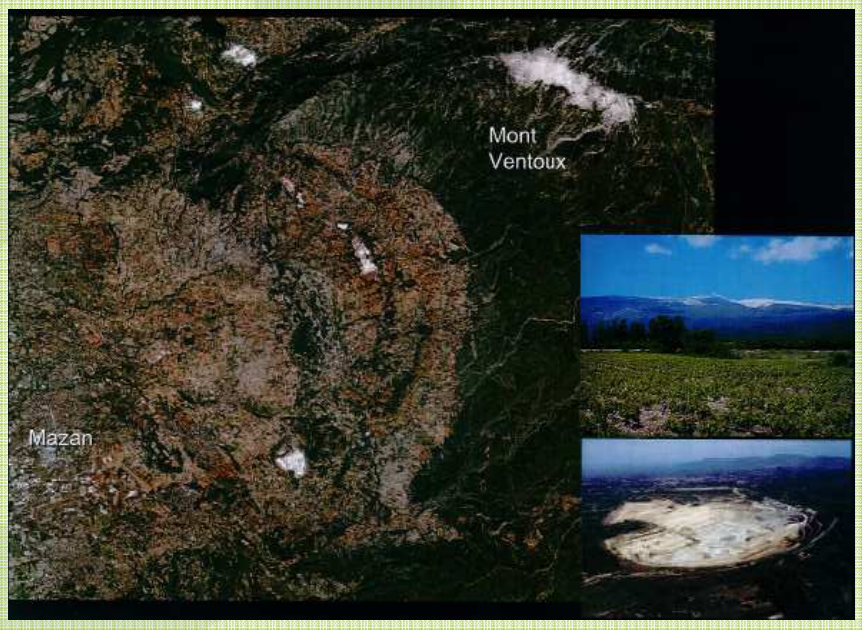
Lead Partner
Provincia di savona

Sustainable Construction in Rural and Fragile Areas for Energy efficiency

Category : Sustainable construction of cultural building

Case study : Mazan community hall





Project situation

At Mazan, the first Provence drama festival was held at the end of the 18th century.
The site put forward for the Mazan community hall project was blessed with a unique and beautiful view of the Mont Ventoux where the valleys and small wooded slopes add to the appeal of the site.
At the heart of this natural juxtaposition with the landscape, the Mazan community centre has found its place.
This large-scale project with a scope that extends beyond the local community is an effective, easily-accessible, multi-purpose and scalable resource for various events: Gatherings; School fairs; Conferences; Shows, fairs etc.
Its capacity between 800 and 1000 people is exceptional for the region with a large usable space that users can adapt to their needs, creating new community uses.
The outdoor space of the main hall provides a symbol that can be seen from the distant Caromb road.
The wood dihedron formed by the facades, softens and breaks up the orthogonal "box effect" of the hangars.
The wood tiling and colour selection that fits in with the region, differentiates it from industrial facilities. It is a cultural facility in its own right

Category : Sustainable construction of cultural building

Case study : Mazan community hall

Sustainable Construction in Rural and Fragile Areas for Energy efficiency

Project situation

The new Mazan community centre is **a project born in Provence**, that meets climatic (sun, wind, rain) and cultural needs.
Designed with careful attention to environmental restrictions, it defines and enhances the location with a minimum amount of sophisticated effects (simple and natural) and materials. This is **an eco-friendly project** that meets demanding standards and provides an answer to the issues facing the environment and society.
Because of the strength of the wind and intensity of the sun, a durable architecture was needed that blends in with the light intensity of the site, the soil and the reflections of the plant life.

Detailed description

The Mazan community hall project has adopted an eco-friendly building approach. Among the different implications of such an approach, particular care has gone into the environmental impacts and the type of materials used in the construction.
A strong feature of the project is the will to reduce energy consumption in the production and shipping of construction materials as well as the development of local production channels. This project makes considerable use of three local resources: wood, straw and gypsum

Wood

The structure and covering materials of the project will be made predominantly using local timber (cedar, mugho and Austrian pines) from the forestry of the Mont du Ventoux. We are already working with the French national forests office to set up this supply chain of local resources.

Straw

The construction of low energy buildings requires the use of high quantities of insulating materials in the outer walls and roof. Resorting to straw-bales as the main insulating material rather than the other industrially produced insulating materials has a number of benefits for the environment. Indeed, this is a material that:

· Enables the local value of a renewable natural resource, contributing also to the fight against greenhouse gases as it is a material that stores CO2.

· Has very useful thermal properties:

- a good thermal resistance, linked to the thickness of the material (360 mm), allowing the building to be constructed with very efficient thermal attributes (passive BBC or Minergie standard): $\lambda = 0.052$ W/m.K across the grain of the straw, which is the preferred direction that we will use; the calculated value passed by certification bodies such as Promotelec is $\lambda = 0.065$ W/m.K and $\lambda = 0.08$ W/m.K along the length of the straw
- A relatively good dephasing coefficient, important during the summer, that is linked to the density of the material (90-125 kg/m2) and the thickness of the layer used (360 mm)

· Excellent "grey energy" rating for the material and its installation

· Recyclable

· Healthy (no treatment involved and therefore no VOC emissions)

· Breathable

· Has very good sound-absorption properties

· Economical: about €15 ex. VAT/m2, supply/installation, for a thick layer of insulation (360 mm)

Category : Sustainable construction of cultural building

Case study : Mazan community hall

Sustainable Construction in Rural and Fragile Areas for Energy efficiency

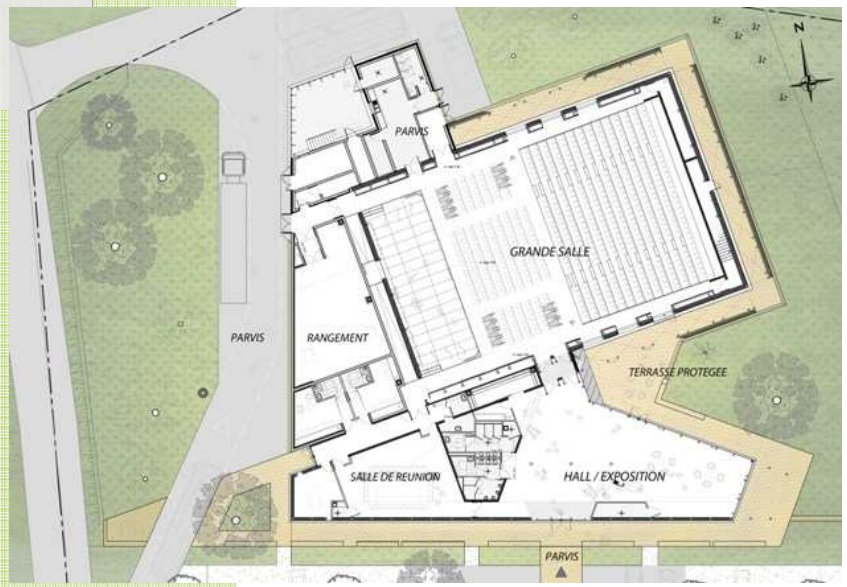
Detailed description

The plaster

The largest open pit gypsum quarry in Europe is located in the district of Mazan. This is transformed locally for use in the production of plaster. This material has useful properties that allow it to be used to render exterior walls.

Indeed, this is a material:

· with a low grey energy rating for a render (low firing temperature of gypsum)
· easily recyclable
· healthy
· breathable
· providing very effective protection against fire



Category : Sustainable construction of cultural building

Case study : Mazan community hall

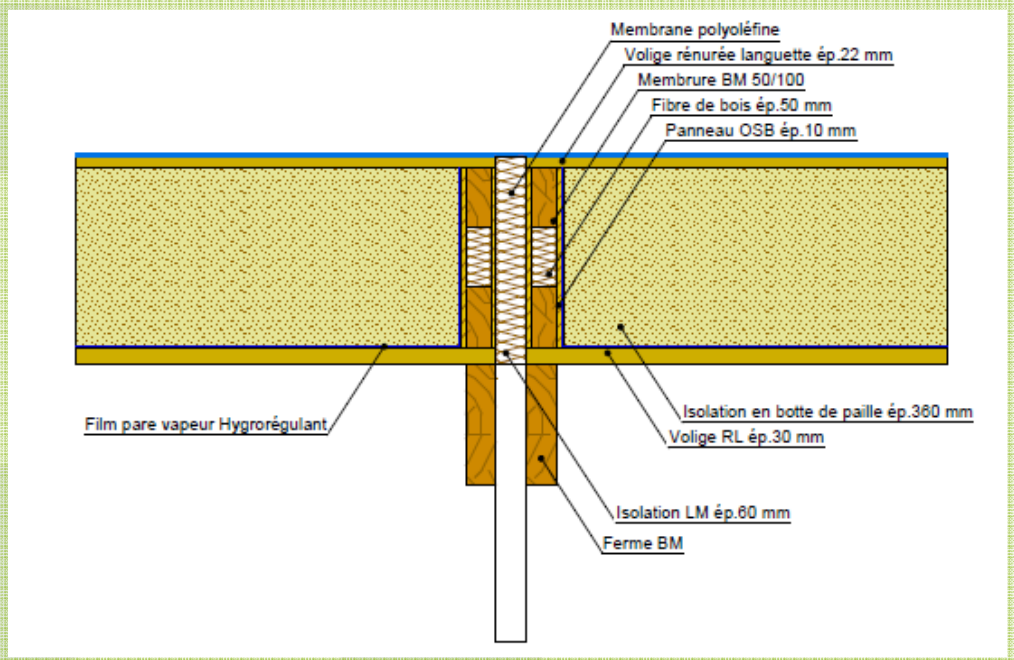


Figure 1

Detailed description

Description of the construction systems

In this project, all the structural features that ensure the durability of the building over time are filled with the wooden structure that forms box-section frames.

The straw-bales used to fill the box-section structure provide thermal insulation.

The features of all the insulated exterior walls in dealing with water vapour will be simulated using the WUFI® software in accordance with the NF EN 15026 standard.

There are 2 types of composition depending on whether it is a vertical or horizontal panel.

Horizontal walls (roofs, figure 1)

The box-section wood frame walls composed of reconstituted STEICO-type beams for the wood frames and 30mm tongue and groove boards on both sides.

The straw is used as an insulating filling between the frame uprights after a hygro-regulating vapour barrier has been installed.

The 30mm-thick tongue and groove panelling provides the thermal protection for the straw (Appendix II of the French decree dated 24/09/2009: instructions regarding inflammable insulating materials in public premises).

Category : Sustainable construction of cultural building

Case study : Mazan community hall

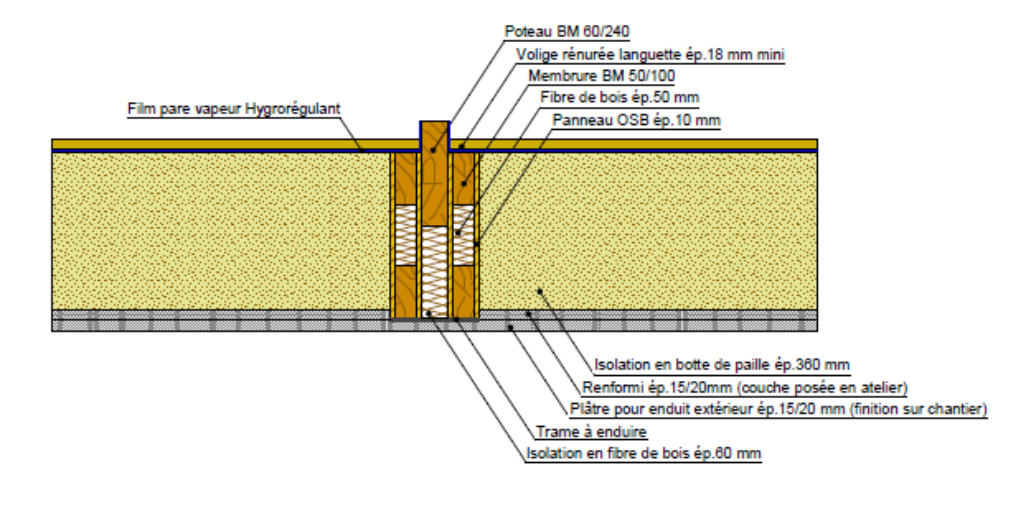


Figure 2

Detailed description

Vertical panels (wall, figure 2)

The box-section's vertical panels are composed of reconstituted STEICO-type beams for the wood frames, covered with 18mm (minimum) tongue and groove boards on both sides.

After the vapour retardant has been fitted, the straw is also installed as an insulating filling between the frame uprights.

Two layers of plaster rendering protect the box-sections on its outer side, one 20/25 mm layer applied at the factory on the surface of the box-section cells to protect the straw from fire and weather conditions during the construction phase, and another 25/30 mm layer applied on site to protect the wood frame and the coloured finish.

The straw on the vertical panels acts as a substrate for the rendering.

The composition and quality of the plaster used to do the rendering is suitable for use on exterior walls without any particular restrictions regarding exposition to the sun.

However, in order to maximise the lifetime of the render, almost all the plaster rendered walls are protected from the weather conditions, either by a wide roof overhang for the reception building, or by a cedar covering for the hall, with roof ridge details that are designed to prevent rainwater from running down the exterior walls.

Category : Sustainable construction of cultural building

Case study : Mazan community hall

Detailed description

Installation:

The box-sections:

The straw filling is done at the factory, so that the quality of the material can be controlled (according to detailed specifications drawn up specifically for insulation using straw-bales), and to save time on site as well (because of the quick fitting of the prefabricated box-section panels, including insulation and vapour barrier, in a single-stage operation).

A detailed specification, that is compliant with Building Regulations for straw constructions, means that the quality of the straw-bales can be controlled while the straw is added, to check weight (density) and humidity levels (see appendix attached for example) in particular.

Certain design and fitting restrictions must be followed when adding the straw in order to ensure the long-term use of the materials and remove certain misconceptions:

- particular attention paid to risks regarding humidity levels (construction layout + application): filling conditions (no moisture during filling process), care taken when covering the box-sections that may be exposed to the weather, etc.
- fire protection: very dense straw-bales smoulder away slowly in the absence of oxygen, unlike straw sticks that burn up very quickly; furthermore, the straw-bales enclosed in the box-sections do not come in contact with the air or the flames; the fire protection for the horizontal and vertical panels will be provided by 30mm tongue and groove panelling in accordance with the regulations pertaining to public places.
- risks involving rodents: the highly compressed straw-bales do not allow rodents through and the arrangement of box-sections with a continuous facing throughout, prevents any intrusion of rodents inside the insulation in any case.

Category : Sustainable construction of cultural building

Case study : Mazan community hall

Sustainable Construction in Rural and Fragile Areas for Energy efficiency

Detailed description

The plaster rendering:

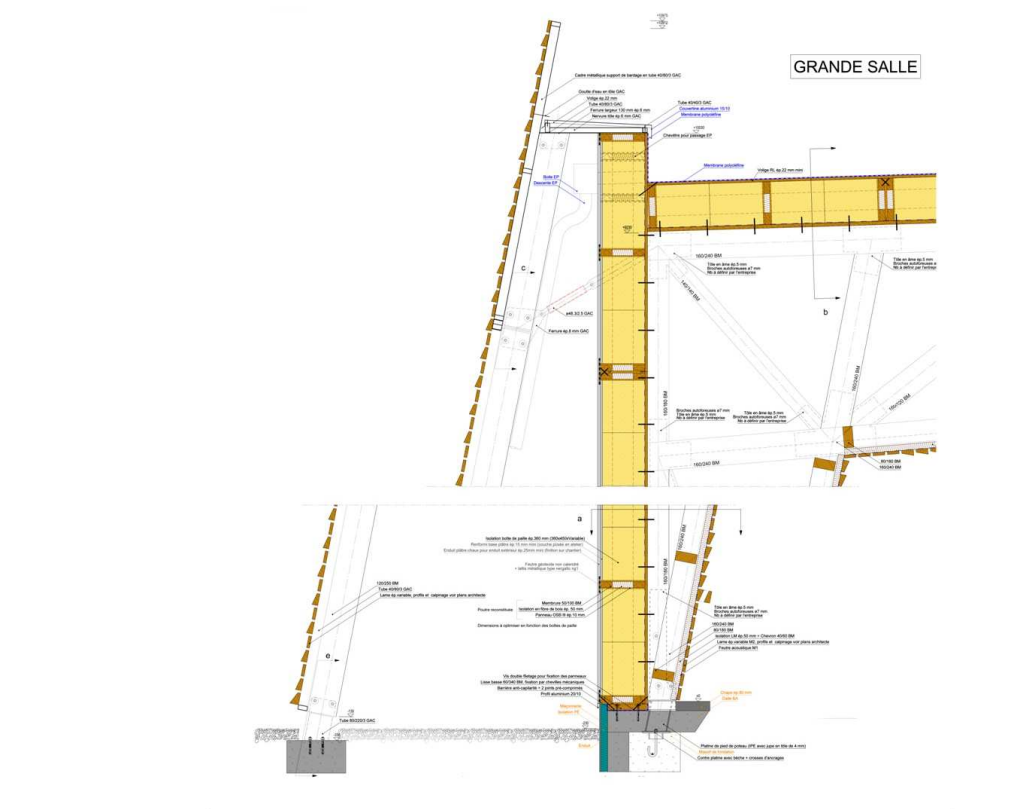
The vertical walls are pre-rendered at the factory. The render is poured onto the box-section that is laid out horizontally. Once the plaster has dried, the box-section can be fitted on site without any straw being visible.

Once the walls are assembled, they are prepared before the final render is applied. These preparations involve fitting the framework to be rendered and the other special elements on the visible wood features as well as the special wall sections. The final render is then done on site, in order to fully protect the walls.

This construction system is used in the building of blocks of flats in Germany (photo no. 1). Experiments are currently being carried out in the laboratories of the Ecole Nationale des Ponts et Chaussées to evaluate the hygrothermal behaviour of these wall panels with precision (photo no. 2)

Category : Sustainable construction of cultural building

Case study : Mazan community hall



Detailed description

Particular attention is paid to the construction of the following details:
Tops of walls: They are systematically treated to avoid exposing the walls to the weather conditions. They will be protected by the overhang of the roof (reception building) or an overhanging cap connected to the wall panel (hall).
Infiltration of the render by secondary elements: These zones will be treated in order to keep water away from the wall and prevent any water from streaming down the wall.
Wall bases: The plaster render stops about 90 cm above the outside ground level at which point it is replaced by a facing that withstands projected water.

The estimated cost of the building project is **2,471,381 Euros ex. VAT.**
Once the stage equipment and tiered seating are included (620 seats) (468,000 Euros ex. VAT), the amount is **2,950,381 Euros ex. VAT**
The estimated cost for the carpark and connecting roads from Modène amounts to 900,000 Euros ex. VAT with a **110-space** carpark**.**

Category : Sustainable construction of cultural building

Case study : Mazan community hall

Project assessment and potential transferability

This project is very interesting given that it is has been put together with the aim of respecting high-quality environmental criteria. This is based on the Mediterranean Sustainable Building method that sets several environmental quality objectives for the building (similar to the HQE approach) but also has a highly innovative project management approach that encourages consultation between the different parties involved in the project. As its name suggests, this approach is suited to the Mediterranean region and its climatic conditions, particularly in the summer. This approach is therefore totally transferable to other countries, insofar as it is suited to the type of governance and organisation employed by those involved in the construction industry in the country concerned.

The use of straw and local wood types can also be applied more widely to regions where cereals are grown and where local forests can produce construction timber. This approach reduces impacts on the environment due to the transportation of raw materials, the grey energy due to construction materials as well as the costs of materials.

The chosen construction system will allow the building to consume 110KWh/m2/year: which is very little for a building of this type. This building should therefore perform very well in terms of environmental and energy consumption criteria.

Project cofinanced by

European Regional Development Fund

Lead Partner

- Province of Savona (ITALY)

Project Partner

- Region of South Aegean (GREECE)
- Read S.A. (GREECE)
- Local Energy Agency Pomurje (SLOVENIE)
- Agência Regional de Energia do Centro e Baixo - Alentejo (PORTUGAL)
- Official Chamber of Commerce, Industry and Shipping of Seville (SPAIN)
- Rhône Chamber of Crafts (FRANCE)
- Development Company of Kefalonia & Ithaki S.A. - Kefalonia (GREECE)
- Chamber of Commerce and Industry Drôme (FRANCE)
- Cyprus Chamber Of Commerce and Industry (CYPRUS)
- Chamber of Commerce & Industry Marseille Provence (FRANCE)

SCORE

Sustainable Construction in Rural and Fragile Areas for Energy efficiency