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Récents projets industriels

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M&G RICERCHE ; Research Laboratory, Venefro, Italy

A chemical industry research laboratory, the building must contain research zones for conducting both heavy experiments and delicate research. The laboratories are served by spaces used for administration, researchers and technical services. The programme of research and of "heavy" experiments is not fixed and must be permitted to develop in the future.

The site eventually chosen, Venafro in the South of Italy, is a large valley surrounded by hills, fields and traditional buildings.

A light tentlike form appeared from the first sketches and evolved into an almost oval form, 85 m by 32 m, creating a single volume covered with a lightweight 15 m high structure, and supported by symmetrical arched metal trellis held by six longitudinal suspension cables.

This space, lit by the translucency of the membrane, as well as by the perimeter steel framed and arched window, is used for both types of research.

The structure is placed in the centre of an oval reflective pool, designed for security, thermal regulation, and to enhance the form and the landscape with its reflections and coolness.

The closed research areas as well as the offices are completely air-conditioned.

The membrane is made of PVC coated polyester, stretched between metal arches. At its base, a cable holds the feet to the arches positioned in the pool.

The junction between the membrane and the metallic perimeter half-arches is made of a supple transparent PVC material that is fixed into the perimeter of the half-arches and on to the membrane's main suspension cable.

2,700 sqm ; 1989 – 1991

OCCAS ; Steel Application Research Center, Zelzate – Ghent (Belgium)

The OCAS Steel Applications Research Center established by steelmakers for research into steel sheet applications is constructed at the intersection of a motorway and a trunk road on the border of Sidmar large steel mill.

The buildings constituting the Center are of two main types : office and laboratory space, and workshops for running tests.

The space earmarked for offices and laboratories must offer the greatest possible practical flexibility permitting the installation of new equipment or new laboratories without interfering with work in progress.

The large testing shops contain heavy equipment and facilities to enable easy handling of heavy items. Convenient access must be provided for articulated trucks. Finally, the overall concept must allow balanced and functional extensions of workshops, laboratories and offices.

The East-West axis is exactly aligned on a main road and acts as a sun dial. The entire project is encompassed within a circular embankment measuring 180 metres in diameter and designed to shield the project from unwelcome local features while preserving the views to the East and West.

Access to the various parts of the complex is via an entrance hall located in a cylindrical tower at the core of the building. It is, therefore, essential that the outer spaces extend inwards to the center of the complex. Given this layout, the organisation of the various functions has to be based on two orthogonal axes, which permit autonomous growth.
The laboratories are located on the first floor on a bridge structure, 162 metres long by 19,5 metres wide, which covers the parking areas. Thus, the countryside remains free of visible parked cars, and visitors have protection from inclement weather.
At top and bottom, the laboratories are provided with 1,5 metre high technical service space, and the building itself is incorporated in the lattice structure of the bridge. The building also contains the offices which, when the laboratories expand, will be moved to a 12-storey cylindrical tower to be built at the center of the complex.
In contrast to the laboratories, the large testing centres with parabolic stainless steel roofing are securely anchored to the ground. An oval road running along the inner side of the circular embankment provides access to high-ceilinged basement spaces. The parabolic roofing gives these workshops a clear span of 42 metres and a height of 16,5 metres, with very slender structural elements.
Absorption of horizontal loads is performed by the load- bearing structure of the glazed bays.
Each gable, of 400 mm high section, rests on a pair of pivoted columns, from which braces transmit the horizontal loads to the foundations.
The building and bridge structure comprise two main truss girders of 6,40 m in height and 19,50 m apart which support the entire edifice.
The concrete floor is supported by secondary lattice transverse girders with a height of 1,50 m placed every 6 m.
8 928 m² ; 1989 - 1991

WALLOON BRANCH OF REPRODUCTION FORESTRY MATERIAL ; Marche-en-Famenne, Belgium

The Forestry Branch situated at Marche-en-Famenne in the heart of the Ardennes Forest houses the treatment process of sylviculture grains coming from the domains of the Walloons Region. It is essentially made-up of a work shop, a series of cold storage areas and a few offices and laboratories.
The actual workshop is composed of a pre-drying zone, storage and an area for treating grain. The irregular polygon shape of the site, timbered with beautiful 200 year old oaks made us choose an ovoid form.
A framework of composed arcs clamped at the edges in an apron of reinforced concrete, constitutes the structure which covers the whole building. Two secondary buildings are placed in the inside of this shell along its longitudinal sides. They house the cold storage, the administrative rooms and small laboratories. They also help in supporting the arcs of the external structure. The central nave is reserved for large machines which treat and pre-dry grain. The building is covered with 1,691 large tiles of laminated reflecting glass.
The initial idea was to use fresh wood because of its capacity to relieve pre-bending stresses from constant curvature. The basic element of the structure is a double layered-arc composed of various rectangular pieces of wood, all being between 6,14 and 6,21 meters long. The arc thus formed of circular segments approximates a funicular curve. The axes of which are all implanted in radian plans forming a torus section. This is an economic design, because it requires a limited number of different wood sections.
The idea of using pre-bent perches to create a building is a concept as old as time, used by Mongolian Yurt to the Zulu Cabin. A revival of interest in this type of construction has taken place recently due to the work of C. Mutschler with F. Otto in Mannheim (1975) and of Kikutake at Nara (1987) and to the experimental buildings in Dorset U.K by architects Ahrends Burton and Koralec and engineer Edmund Happopld (1982).
1,144 sqm ; 1992 – 1995

DUPUIS PUBLISHING COMPANY ; Marcinelle, Belgium

The new headquarters for Dupuis are located in front of their main distribution centre taking advantage of the existing landscaped site on its north-east facade. The clients requests an economical building, adaptable to rapid changes both in demand and in use, creating a friendly and interactive work environment.

A raised concrete platform on top of the entrance hall, allows access to a loading bay and parking areas, and serves as a support for four office blocks that are separated from each other by three atria. The whole is encapsulated in a clear glass envelope.

This morphology of space organisation allows for direct day light to reach every employee, a maximum flexibility in the layout of the workstations and easy rearranging of groups of people in function of their space needs. Asymmetrical internal growth is possible not only on the same floor but simultaneously on neighbouring floors in the same block, or in adjacent blocks with the use of flying bridges.

All vertical and horizontal circulations, as well as utilities are separate from main office spaces. Thus employees may enter their office or work areas either through the internal façade or more typically through an internal corridor. This layout presents the same net usable area to gross area ratio as a classical, but much less flexible, office layout.

The study of the physical comfort aspects of this kind of building depend strongly on its orientation. The orientation of Dupuis is ideal as the main glazed facade faces North and the slightly glazed South facade faces the distribution centre. The plain transparent double glazing of the facade needs only sun protection on its smaller East and West side. A careful study of the daylight conditions in conjunction with the thermal load of the atria enables the limitation of vertical roof glazing.

The building is equipped with air distribution and small heating units in the offices and air exhausts through the atria. The structure of the building is, as a consequence, very simple. It is composed of concrete columns and flat hollow slabs, all services (air distribution ducts, electrical and data wiring) are located in the fixed suspended ceiling accessible through the concrete floor slab and, above, through its sides along the atria. This device allows for partitions of a constant height that can serve either as divisions between the atria and the offices or between the offices. Furthermore, this simple layout allows the free partition of modules which have been selected for this project at 30 cm, 60 cm, 90 cm and 1,20 m.

Special care is devoted to the use of simple materials : plaster for the suspended ceiling, linoleum as floor covering, wood and chipboard for the partitions and the furniture.

This concept reduces capital investment as well as maintenance and running costs, offering simultaneously a flexible and preferment work environment.
3.060 m² ; 1993 – 1995

SMITHKLINE BEECHAM BIOLOGICALS, S.A. ; Research and Development Centre – Rixensart, Belgium

SmithKline Beecham Biologicals s.a. has been located at Rixensart for over forty years. The site of the company runs parallel to rue de la Hulpe, and is perpendicular to the rue de l'Institut, from where the site is accessed at number 89.
In order to respond to the expansion of functions and staff, two buildings are added to the site, in the central area : the north building is to house administrative activities (arch. ELD) and the south building is to shelter research and development activities. This central area thus becomes the focus of the company's activities.
Parallel with the construction of these two buildings, an extensive landscaping study is carried out in order to gives the site its final configuration.

1. Architecture

The plan for the Research Centre is based upon three primary principles :

- *A close relationship between management and research;*

. *The integration of the building with adjacent structures that are also used for research and development to create synergy among the researchers;*
. *The creation of a new complex around which all activities carried out at the site are centred.*

The adjacent structures are renovated, transformed and extended to included a new auditorium, to enlarge the library and to create a central lounge and meeting area accessible both to people engaged in research and to administration staff, thus fostering synergy among the company's employees.

The new building contains three floors of laboratories and a basement level for technical functions. Between each of the three levels, an accessible technical floor provides space for the technical equipment needed and lends flexibility for future development of activities.

The space between the existing and the new buildings is covered so as to create an atrium.

The three principle levels (atrium, meeting area and auditorium and administration centre) are accessible via an annular passageway that links all functions.

On the South side of the new buildings, 5 levels of offices are laid out along the atrium, adjacent to the laboratories and intermediate technical floors.

The new building is designed in a sober and serious style; fully glazed, it is perfectly transparent, both form exterior to interior and between the various areas inside the building. Natural light can thus reach the borders of the laboratories.

A lightweight metallic roof, partially glazed at South and West side, covers the atrium, overhangs to both the East and West, and is supported by shrouded columns that define the two principle entrances to the complex. The height of the building being limited, three levels, including the pilot production units, are underground.

Vertical circulation is divided along the West, East and South facades. The East and West shafts are glazed volumes containing a concrete staircase and one or more glazed elevators. The South staircases in metal and wood open onto the atrium and the elevators are glazed. The exterior emergency staircases are constructed in galvanised steel at the North side of the main building and at the South side of the secondary building at the back of the atrium.

Footbridges on the three principles levels, to the South and West of the building, as well as raised passageways attached to the facades of existing buildings continue the passageways and make every research and administration departments accessible to all employees.

The visual communication provided by the central lounge and meeting areas encourage interaction and foster positive synergy among all employees working in the building.

The interior design is serious and functional, as fits these types of activities. The partition are plaster sheets set in metal structures and woodwork with large glazed sections. The partitions offer maximum flexibility in layout, adaptable as necessary to the evolving needs of the Centre.

The floor is covered in vinyl and the walls are painted in plain neutral white colours. Only the decor of the central common areas is given special attention.

2. Structure

Due to bad soil conditions, it is necessary to opt for an extremely rigid structure of beams and columns, on a compact grid of 9.60 by 9.60 m. The columns rest on barrettes (part of the slurry walls) that lean on a 25m deep chalky layer. The presence of a significant quantity of water due to the high water table entails the construction of a waterproof tank made of slurry walls.

The superstructure is composed of a skeleton of concrete clad metal columns and 80 cm by 75 cm heavy concrete beams at the laboratory levels. The technical floors are composed of a lighter skeleton of small steel beams that transversely divide the 9.60 m square grid into four 2.40 m sections.

A 2.40 m wide overhanging passageway runs all around the building.

The laboratory subfloors, are formed of 45 cm thick prestressed concrete TT slabs and beams, laid longitudinally in 9.60 m lengths and with a life load of 1 000 kg per m².

The accessible false ceilings are wood planks laid on a steel structure that can sustain a life load of 250 kg per m² to carry the laboratorium equipment. In the mezzanine office zone, the life load is increased to 500 kg per square meter.
The lateral loads in the basement are transmitted to the side walls by horizontal shored concrete beams poured in place and by a secondary structure in steel. Construction phasing of the basement floors allows to avoid temporary bracings of the excavation.
The glazed facade and its steel structure are totally hung from the main floor cantilevers and rest on the slurry walls.
Lateral stiffness of the structure is provided by large exposed bracings just behind the glazed facade.

3. Mechanical, Electrical and Plumbing Engineering

Mechanical, electrical and plumbing routes follow a clear and simple scheme in order to avoid any possible mixing of fresh and polluted air :
- *to the south, hood extractor exhaust and exhaust from room ventilation are routed to the roof;*
- *the North facade of the building contains the intakes for fresh air and the electrical and plumbing ducts.*

Air is distributed horizontally on each level across the technical floors located above every laboratory floor.
Each laboratory floor is serviced from its upper technical floor to avoid boring the laboratory floors, preserving the rigidity of the structure and precluding the risk of cracks, leaks or drafts.
19,884 sqm ; 1994 – 1999

Samyn & Partners, septembre 1999