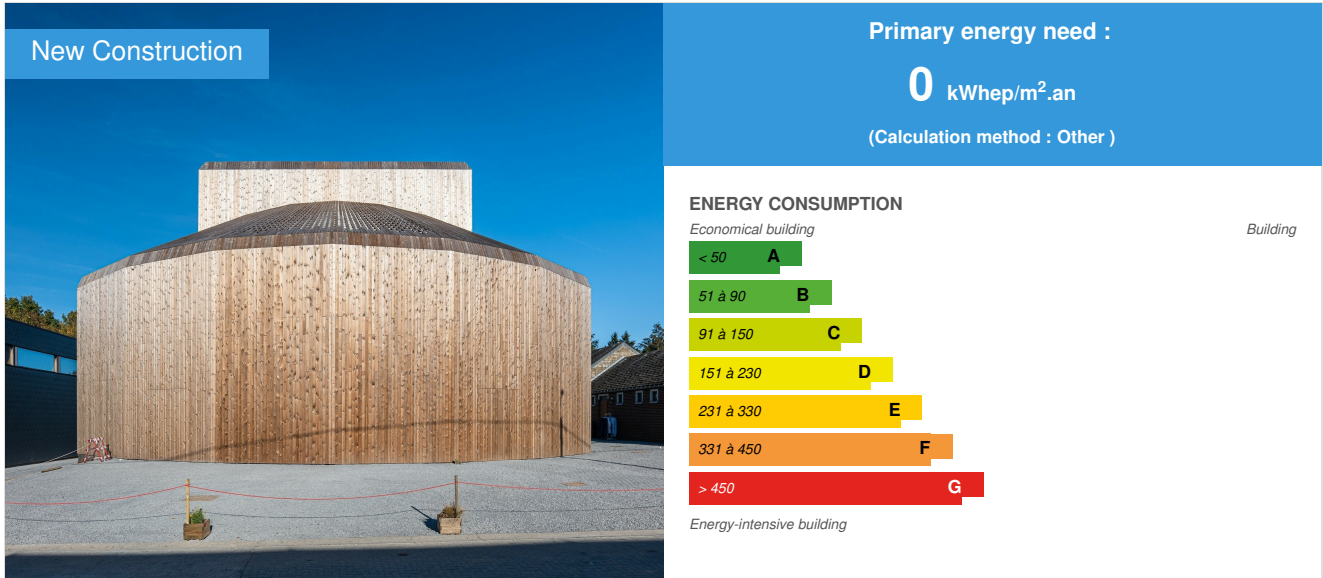


# The Marchin circus

by Nathalie LEBRUN / © 2023-02-24 16:01:37 / Belgique / 1009 / FR



**Building Type** : Other building  
**Construction Year** : 2021  
**Delivery year** : 2022  
**Address 1 - street** : place de Grand Marchin 4570 MARCHIN, Belgique  
**Climate zone** : [Cfb] Marine Mild Winter, warm summer, no dry season.

**Net Floor Area** : 414 m<sup>2</sup> SHON  
**Construction/refurbishment cost** : 1 490 000 €  
**Number of none** : 1 none  
**Cost/m2** : 3599.03 €/m<sup>2</sup>

## General information

### The Circus of Marchin

Le Cirque, a wooden structure adapted to circus practice, offers a scenic space 16 meters wide by 13 deep, a free height of 10 meters, numerous hanging points and is equipped with a dynamic floor. Accommodating a 300-seat stand, this infrastructure was designed by the Atelier d'architecture Meunier-Westrade and built by the company Stabilame. It was created thanks to the support of the Province of Liège (on a proposal from Liège Europe Métropole), the Wallonia-Brussels Federation and the Municipality of Marchin.

The Cirque de Latitude 50 tends towards a minimalist architecture at the service of its users, its spatiality is the result of the function and intrinsic qualities of wood as a construction material. Composed of a box dedicated to the circus arts to which is added a space intended for the public, the two functions are swallowed up by a wooden drapery... Two spaces, one day united to be a place of dissemination, one day split to be a place of repetition. During performances, the public will be positioned on a bleacher that will extend to the edge of the stage. Intimacy and proximity will thus be preserved, in the spirit of circus and street arts.

Favoring a local economy, this all-wood construction is wrapped in high-performance insulation and equipped with innovative technologies, so little energy is needed to offer optimum ambient comfort.

### Three keys to understanding the project

The minimalist architecture was designed to be hyper-functional: the volume of work and the volume of bleachers for the public. Each element has been designed

to minimize the raw materials, in the same philosophy as this vision of two volumes separated and united at the same time, with a "simple wooden drape" to cover them.

The material, wood, is expressed in all its flexibility. Straight lines, curves, maximized openings, it is a pleasure to work with the material, both for the architect and for the craftsmen. While respecting the material in its nobility, optimizing the elements as well as the circular economy it allows (optimization of the material, recycling of waste,...).

Because sustainable development has been part of the project from the start: the use of wood, for biosourced, renewable and low-carbon materials; a vision of energy independence, for the planet and the finances of Latitude 50, and finally an architecture serving the well-being of the occupants.

Town planning: administrative and architectural constraints

While some Latitude 50 projects have been more circumscribed, the circus, a building with a cultural function and to welcome the public, has benefited from attentive listening to town planning, open to a more singular project.

Wood was a driving force behind the acceptance of the dossier, given the traditional use of the material in the barns of Condroz and the Ardennes.

The singular form, due to the activities of the circus, was also accepted because it refers to the large volumes of local barns.

Insulation, a rational path

The search for thermal performance combined with a competitive price rejected the initial choice of straw insulation. The implementation, the low prices of conventional insulators led to a reasoned choice. This is probably the only regret of the project. But the result of an energy-autonomous building remains a satisfaction for all.

Circus activities

No one suspects the constraints inherent in building a circus! Vertical and horizontal effects in all directions required a much greater consideration of the statics and the building than for traditional activities.

Solutions were found in collaboration with the architect, the contractor-manufacturer and the design office. Also worth noting is the development of a dynamic, rebounding floor, for the well-being of performing artists.

The fire constraint

Fire standards in Belgium are sometimes outdated and penalizing for the use of wood. However, the whole circus is made of wood, and it is above all a place intended to welcome the public.

For the facades, the project followed the recommendations published by the BBRI / EMbuild (Scientific and Technical Center of Constructino). For continuous wooden roofs, this is a unique case, and laboratory tests conducted by Stabilame with the BBRI / Embuild have made it possible to achieve qualitative levels of fire protection.

An atypical structure: the alliance of systems

The prowess of the Marchin circus also lies in the construction of large empty volumes, in non-parallelepiped shapes. The ingenuity was to couple two construction systems, taking advantage of their strengths. The open volumes were created through the use of specific glued-laminated porticos (posts-beams). The glued CLT closed the building, providing bracing and a massive character of wood finish, insulation and stability to the whole.

Respect the design on a fireproof roof

The architect's pencil stuck to it: the leaning wooden roof had to show a fan, a visual reminder of classic circus tents.

However, the great challenge of this leaning roof made entirely of wood, was to meet fire regulations.

A perforated cladding was developed, with a search for optimization of material, in order to create the desired visual effect, with fireproof cladding boards, the whole being then accepted in the global fire protection project.

Thanks to these innovative concepts, the Cirque de Marchin is today an exceptional place of welcome, a warm theater, which hears laughter and silence, which watches both clowns and acrobats that leave the heart in suspense.... While respecting the surrounding areas and the desire to impact the planet as little as possible. In short, let's keep our smile!



## Building users opinion

In this place of cultural reception, there are two types of occupants.

The permanent occupants, namely the artists, and the temporary occupants, the spectators.

The most important return is certainly that of the permanent occupants. Artists who perform their rehearsals in the circus do so during the day and evening, all

year round.

They greatly appreciate the thermal and acoustic qualities and comfort of the place. The most recurring remarks relate to the soothing feeling of wood, to the comfort of light during their rehearsals, because light supply areas have been created especially for this (unlike traditional circuses).

The spectators, for their part, appreciate the thermal comfort of a permanent circus, but greatly appreciate the warm atmosphere provided by the wood. The bleachers, all in wood, are very comfortable and fit perfectly into the spirit of the place. The comfort of the spectators is part of their positive remarks, both in speaking of the cushions of the stands, and of the good general acoustics.

It is therefore a cultural place that satisfies both workers and spectators, and harmonizes with the pleasure that everyone finds in sharing clown, juggling or acrobatic acts.

## If you had to do it again?

The project has remained on its foundations: using as many biosourced materials as possible for its load-bearing structure and its facing.

The desire to use biosourced materials (initially insulating straw) for this specific building was overtaken by technical constraints and budgetary reality. The compromise was positioned in a choice of classic insulation, while maintaining the wood for the structure, the closures and the facing.

To be redone, in a current context of favorable repositioning of the price of biosourced insulators, biosourced insulators would be selected, in order to perfect the philosophy of the project.

## See more details about this project

<https://www.ateliermw.be/portfolio/latitude-50-pole-des-arts-du-cirque-et-de-la-rue/>

<https://www.stabilame.be/index.php/marchin>

## Data reliability

Self-declared

## BIM approach

By working as a bouwteam, the architectural firm Meunier-Westrade and the contractor Stabilame exchanged numerous files. The 3D modeling and the open IFC files of the Cadwork software and the latter's GL web sharing system, made it possible to share documents without having to copy elements. In particular during the manufacturing drawing, before production, to obtain the approval of the architects. The digitalization of Stabilame makes it possible to forward this information in production (machining centers directly linked to production design offices), in logistics, and even on site where the fitters and technicians work by reading plans with tablets for access to the complex information of this type of site. The 3D models directly implement the production files of certain suppliers, Stabilame sends them the production file and they do not have to copy anything. examples: fittings, frames, EPDM sealing sheets, ....

## Photo credit

Atelier Meunier-Westrade et Stabilame

## Stakeholders

### Contractor

**Name** : Latitude 50 Pôle des arts du cirque et de la rue

**Contact** : info@latitude50.be

<https://latitude50.be>

### Construction Manager

**Name** : Atelier Meunier-Westrade

**Contact** : info@ateliermw.be

<https://www.ateliermw.be>

### Stakeholders

**Function** : Construction company

Stabilame

info@stabilame.be

<https://www.stabilame.be/>

Closed wooden structural work, insulation and cladding, wooden bleachers, ...

---

**Function** : Other consultancy agency

CAMBIUM

info@be-cambium.com

<https://be-cambium.com>

study desk floor and wooden structure

Function : Manufacturer

Menuiserie Riche

welcome@chassisriche.be

<https://www.chassisriche.be/>

French windows

## Contracting method

General Contractor

## Owner approach of sustainability

Latitude 50, the circus and street arts center, wanted to create a permanent circus to welcome artists, in temporary residence in their infrastructure, to develop their shows there, as well as to give performances there.

More than a circus, this space becomes a place of work, rehearsal, a place of reception for culture.

The approach of Latitude 50 is twofold. First, they want the circus to be integrated into the village, which has hosted their structure and has become an internationally renowned center for the circus arts: it was therefore necessary to plan for integration in a rural and natural place.

Secondly, they want to create a friendly, reassuring, beneficial workspace for their permanent users, the artists, as well as for their temporary users, the spectators.

The architectural project, brought together in a bouwteam by the architecture studio Meunier-Westrade and the construction company Stabilame, was selected because both the architecture and the wood material offered brought added value. This added value is respect for the village and the people, which corresponds perfectly to the values of Latitude 50.

The concepts of decarbonation, energy savings, rationalization of materials, energy autonomy crossing the ideas of lagooning, re-employment and well-being of the occupants, enabled this project to correspond to 100 M to the owners' values.

## Architectural description

The Cirque de Latitude 50 tends towards a minimalist architecture at the service of its users, its spatiality is the result of the function and intrinsic qualities of wood as a construction material. Composed of a box dedicated to the circus arts to which is added a space intended for the public, the two functions are swallowed up by a wooden drapery... Two spaces, one day united to be a place of dissemination, one day split to be a place of repetition. During performances, the public will be positioned on a bleacher (300 seats) which will extend to the edge of the stage. Intimacy and proximity will thus be preserved, in the spirit of circus and street arts.

Favoring a local economy, this all-wood construction is wrapped in high-performance insulation and equipped with innovative technologies, so little energy is needed to offer optimum ambient comfort.

## Energy

### Energy consumption

Calculation method : Other

More information :

not applicable because recent start-up of the building (October 2022)

### Real final energy consumption

Real final energy consumption/m2 : 190,33 kWh/m<sup>2</sup>.an

Year of the real energy consumption : 2 022

### Envelope performance

Envelope U-Value : 0,24 W.m<sup>-2</sup>.K<sup>-1</sup>

More information :

use in theaters, therefore calculation of PEB different in Belgium. (upeb1)

K-level: 0.18

average heat loss coefficient (Um): 0.26 m

Building Compactness Coefficient : 2,34

Users' control system opinion :

## Renewables & systems

### Systems

#### Heating system :

- Heat pump

#### Hot water system :

- No domestic hot water system

#### Cooling system :

- Reversible heat pump

#### Ventilation system :

- Double flow heat exchanger

#### Renewable systems :

- Solar photovoltaic

#### Other information on HVAC :

Thanks to controlled mechanical ventilation, the space is permanently ventilated. It is used both for air renewal and for heating.

In the use of the building, there are two types of periods: work periods (creations, rehearsals) and performance periods.

In summer, during work periods, natural ventilation via the roof opening is sufficient to keep the building cool (low tech, no energy required). During shows, ventilation is provided by the VMC.

In winter, the heating produced by a heat pump is diffused by the VMC, there was beforehand recovery of energy on the air extracted with a plate exchanger.

Thanks to the solar panels, the building tends to reach zero energy (phase 2 in the course of assembly – beginning, no photo).

In order to limit the epidemiological risks, the VMC system with plate heat exchangers was preferred. Unlike a cylinder heat exchanger, the air is not recycled but fresh air, heated by the plate heat exchanger, is brought into the circus volume each time. This point is essential in the event of an epidemic.

The placement of solar panels, aimed at the autonomy of the building is in progress (it was a phase 2, which has begun). We have attached the invoices and offers to better inform you.

#### Solutions enhancing nature free gains :

Natural ventilation in summer, carried out via the roof opening, is sufficient for cooling during work periods (creation, rehearsal) to cool the space, and does not require any energy.

Unlike the majority of other performance spaces, two light entrances have been planned, a double glazed door and the roof opening. These two light entrances are used during work periods (creation, rehearsals), in order to benefit from daylight, and not to use artificial light (energy saving).

## Environment

### Biodiversity approach

The steps for biodiversity are threefold. The first two are part of the overall project which includes the circus site and the neighboring building, the circus school, which is not part of this competition. The ground layouts of the overall site favored gravel, in order to allow rainwater to percolate into the ground naturally. Similarly, in order to manage the waste water produced by the circus school (shower and toilets), a lagoon has been built below, creating a pond and an environment conducive to biodiversity. The circus rejects very little waste water, since it only contains a sink. But the little waste water discharged is in the same lagoon.

Finally, the choice of a wooden structure is far from trivial. Indeed, all structural wood, both the CLT walls and the post-beam structure, are PEFC certified. The PEFC label certifies that the wood comes from sustainably managed forests, which includes respect for the biodiversity of the forest. As the wood comes from local forests (glued CLT) and Scandinavian (posts-beams), this is an important point at both local and European level.

#### Mitigation actions on soil and biodiversity :

The steps for biodiversity are fourfold. The first two are part of the overall project which includes the circus site and the neighboring building, the circus school, which is not part of this competition. The ground layouts of the overall site favored gravel, in order to allow rainwater to percolate into the ground naturally. Similarly, in order to manage the waste water produced by the circus school (shower and toilets), a lagoon has been built below, creating a pond and an environment conducive to biodiversity. The circus rejects very little waste water, since it only contains a sink. But the little waste water discharged is in the same lagoon.

Finally, the choice of a wooden structure is far from trivial. Indeed, all structural wood, both the CLT walls and the post-beam structure, are PEFC certified. The PEFC label certifies that the wood comes from sustainably managed forests, which includes respect for the biodiversity of the forest. As the wood comes from local forests (glued CLT) and Scandinavian (posts-beams), this is an important point at both local and European level.

### Risks

#### Hazards to which the building is exposed :

- Wind / Cyclone
- Heatwave

#### Risks measures put in place :

During the long episode of extreme heat experienced during the building's first summer, it proved to be very cool: there were no overheating problems.

The controlled mechanical ventilation unit allows cooling to provide optimum comfort if the need arises. This is more of a ventilation comfort during performances including an audience.

Outside of shows, during work periods (creation, rehearsals), ventilation is at low speed with heat recovery in winter and, in summer, the only ventilation is low-technology, natural ventilation via the roof cupola. During episodes of outside heat, the hot air rises in the technical grill located above the stage. The opening of the dome is enough to extract the hot air cushion which is positioned at the top. The entire volume therefore remains very fresh.

The village of Marchin is located on a hill, which protects it from possible flooding, but subjects it to the wind. This is why a reflection integrating the factor of high winds was taken into account in each study of the building's statics.

## Urban environment

The environment of the circus is truly rural. Located on the side of the village of Marchin, the circus does not encroach on the other functions of the village, it complements them. It also complements the functions of the other Latitude 50 buildings located next door and integrated into the village.

There is no shortage of green spaces, given the fields located near the Cirque. Shops and activities are limited to the usual rural services, and mobility is served by a regular bus service.

## Products

### Product

Stabilame glued CLT - local wood production

Stabilame SA

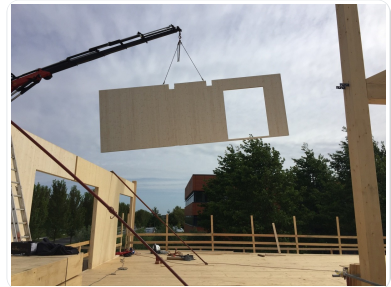
info@stabilame.be

<https://www.stabilame.be/>

**Product category :** Gros œuvre / Structure, maçonnerie, façade

Glued CLT panels, in solid wood of 12 x 3 m in local wood (Belgium, Luxembourg, N-E of France), with environmental labels such as biosourced label (98%), ACV-DEP (B-EPD in Belgium in TOTEM) + (FDES in France in INIES).

The CLT walls met with unanimous approval, for all the stakeholders, for its speed of installation, its technicality (3D modeling and prefabrication) but above all for the warm character of the wood in the finish.



Mixed post-beam-CLT structure

STABILAME

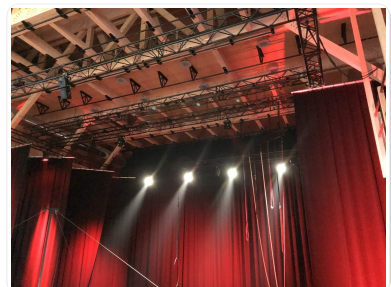
info@stabilame.be

<https://www.stabilame.be/>

**Product category :** Gros œuvre / Structure, maçonnerie, façade

Mixed wooden structures, involving both posts and beams, frames and glued CLT, for controlled volumes

The solution of mixed construction systems has facilitated the design of a large open volume, which will want to be scalable and anticipates the deconstruction at the end of the building's life.



Furnishings in re-use: above-below bleacher

Atelier MM srl - Le quotidien-quotidien

hola@lequotidienquotidien.be

<https://www.lequotidienquotidien.be/>

**Product category :** Second œuvre / Équipements intérieurs

Tops/cushions in fire-resistant fabric, the scraps of which were used for the furniture of the Cirque de Marchin and the manufacture of textile objects and jewellery. Wooden base/furniture from offcuts from the workshops of the company that built the circus.

Olivier Minet, director of Latitude 50: "Nice job, it looks very good!". - Stéphanie Calonne, actions with Associations, citizenship, decentralization of the Maison de la Culture in Tournai: "Delighted with my brooch, from the fabric of the cushions of the Cirque de Marchin!"



Scots pine doors, integration of cladding

Menuiserie Riche

welcome@chassisriche.be

<https://www.chassisriche.be/fr>

Product category : Second œuvre / Menuiseries extérieures

European and local wooden doors. For the circus, the Scots pine doors are of the same essence as the cladding. In addition to 1 glass door, two doors (1 single and 1 double) have been designed to receive the cladding identical to that of the façade of the circus, and to arrive in the same plane by closing the doors.

The doors fitted with the cladding blend completely into the facade. The builders are very happy with it.



## Costs

### Construction and exploitation costs

Total cost of the building : 1 490 000 €

## Circular Economy

### Reuse : same function or different function

Batches concerned by reuse :

- Indoor joineries

For each batch : Reused Materials / Products / Equipments :

Waste glued CLT walls were recovered from the manufacturing plant, less than 100 km from the project. From this waste, the architects accompanied by craftsmen have made the interior furniture.

3 high tables

7 benches on wheels that can be placed either at reception or in addition to the first row bleachers

1 counter element with a piece of furniture for the integrated fridge (nice mini bar)

2 reception counters, their "G" shaped profile illustrates the set comprising the tablet and the seat. The dimensions of the furniture are studied so as to be able to cross the bleachers to reach the stage (via the PMR passages).

These 2 counters are also equipped with hooks so that they can be adjoined and thus form a meeting table. The space under the bleachers is then transformed into a meeting room.

Field of use and material origin :

The various pieces of furniture are made with wood waste from the glued CLT manufacturing plant, Stabilame, located in Mariembourg, as well as with leftover fabrics and foams from the making of the bleacher cushions. As for the wood, the elements were too small to be used structurally, and were waiting to be transformed into wood-energy. Re-use is a way of prolonging the life of wooden elements, of perpetuating the sequestration of the CO<sup>2</sup> contained in the wood.

### Environmental assessment

Impacts avoided : water, waste, CO<sub>2</sub> :

Reusing bonded CLT has two benefits. On the one hand, it did not generate waste, being themselves waste subtracted from a purpose of wood-energy. On the other hand, their use in furniture avoids rejecting the CO<sup>2</sup> contained in the wood when it burns as energy wood.

### Economic assessment

Total cost of reuse : 500 €

### Reproductibility and Innovation

It is difficult to say that this reuse is an innovation. It's mostly common sense. Recovering wooden structural elements to make furniture and interior fittings seems so obvious.

On the other hand, the innovation lies in the design of certain elements, such as the reception counters on wheels whose "G" profile, forming the shelf and the bench, allows, among other things, more conviviality (height of the eye) between the reception staff (seated) and the spectator (standing) who comes to the

"window". In addition, the two counters transform into a meeting table when placed face to face. An exclusive design by architect Matthieu Meunier.

#### Storage of dismantled materials and management in situ reused materials :

The storage of wood materials was done initially at the manufacturer Stabilame, then brought just for its revalorization in furniture at the craftsman who worked on the wooden elements and assembled them to make furniture.

## Health and comfort

### Water management

Given the use of a theater (circus), there is no need for water. A single water point is available in the building, in the form of a sink.

### Indoor Air quality

Indoor air quality is largely defined through ventilation.

Ventilation is carried out with controlled mechanical ventilation, always used during show periods. Natural ventilation, via the roof opening, is used for work periods (creation, rehearsals). The plate heat exchanger coupled to a heating coil (on heat pump) also produces heating in winter.

The specificity of ventilation is its approach to air quality at the sanitary level. Indeed, the building having been built during the covid period, the selected system includes a plate heat exchanger. Unlike a cylinder heat exchanger, no air particles are recycled but fresh air, heated by the plate heat exchanger, is brought into the volume of the circus each time. This point is essential in the event of an epidemiological episode.

Another point of attention for indoor air quality is the fire retardant that has been applied to the wood, inside the building. This product has obtained the A+ label for indoor air quality, the best possible result.

### Comfort

#### Health & comfort :

Much attention has been paid to well-being in the building, both for workers and spectators.

The luminosity and keeping the wood color of the building were debated in the project, because many places for shows and rehearsals are designed in a black box. It was decided to include entrances of natural light and to keep the natural color of the wood mainly to bring well-being to the artists in residence, to the people of the show who create and rehearse their acts in the circus.

Indeed, the natural light, available via a roof dome and a double side glazed entrance door, overlooking the stage, allows daylight to appear during the creation and rehearsal periods and can be concealed during the shows. This contribution of natural light is important for two points: on the one hand a visual comfort, of contribution of natural light for the health, the sight, the contributions of vitamin; on the other hand, to maintain a link with the external reality: knowing how to situate the time of day when the workers are, staying in communication both with the time units and with the meteorological elements.

Leaving a majority of natural wood was preferred, to maintain a warm appearance, and much brighter than a black box. Wood, a healthy material, brings a soothing side that promotes concentration in the preparation of show numbers.

Ventilation is one of the techniques used to improve the comfort of users and spectators, both for temperature regulation (heating and cooling) and for air changes to limit epidemiological risks (see article ventilation).

Finally, it seemed important to us to include PMR access in this section, because the inclusion is done in a subtle way, so as not to highlight PMR spectators. Indeed, the positioning in a complete arc of a circle of the bleachers would have, at the start, required PRM spectators to enter through the side door, in front of the stage, that is to say in front of the public, drawing on them an attention that they probably don't want to. For more inclusion, the architect designed two entrances with PRM space embedded in the stands. Two parts of bleachers are effectively removable, leaving the passage between the reception area and the stage to pass with a wheelchair. PRM groups would be accommodated in front of the first tier, with access via these two removable PRM seats in the tiers. It's the circus for everyone.

#### Acoustic comfort :

The volume is very high, so that circus arts, juggling, acrobatics and other clowning can be done. Acoustic work was carried out with the installation of an acoustic wall on the back of the stage. The resonance effect has been greatly reduced for the comfort of the spectators.

The back wall of the stage was fully lined with acoustic and fireproof insulation, covered with a black fireproof canvas. The reverberation time is very low, which is particularly comfortable for spectators and users of the performance hall.

#### Temperature level :

Once again, it is necessary to distinguish the two periods, that of work or that of shows, as well as the summer and winter seasons.

In winter, the temperature is regulated by the heating which is produced by a heat pump and diffused by the double flow VMC ventilation (heat recovery), whether during work periods (rehearsals, creation) or during performance periods.

In summer, the building is quite cool on its own, and can ventilate naturally through the roof opening in order to extract any cushion of hot air that may have formed in the height (technical grill), especially during work periods. During show periods, the VMC allows cooling including air renewal.

#### Humidity control :

Controlled mechanical ventilation, with air renewal, makes it possible to control the relative humidity in the air. The building is not damp, since it is made of wood and therefore of dry matter (compared to traditional materials), so it is a building that was put into operation quickly.



#### Acoustic comfort :

The volume is very high, so that circus arts, juggling, acrobatics and other clowning can be done. Acoustic work was carried out with the installation of an acoustic wall on the back of the stage. The resonance effect has been greatly reduced for the comfort of the spectators.

The back wall of the stage was fully lined with acoustic and fireproof insulation, covered with a black fireproof canvas. The reverberation time is very low, which is particularly comfortable for spectators and users of the performance hall.

#### Visual comfort :

Visual comfort in the Cirque de Marchin project is based on 3 main points, two interiors and one exterior.

Inside, the wood material fills the space, bringing the natural and soothing visual. It alternates with black fabrics (acoustic structure), giving depth and mystery to certain places. Inside, visual comfort is also reflected in the installation of bleachers. The spectators seated on the tiers have a perfect view not only of the stage but also of the volume going from the stage to the grill, the space for juggling and acrobatics.

Outside, the wooden cladding studied with pre-aged tones, rests the eyes. Soft colors, integrating perfectly into the rural landscape of Marchin, both by the material and by its volumes close to old barns.

#### Ergonomic design :

Ergonomics exists in the circus of Marchin on two levels: for the spectators and for the artists.

For the artists, the architecture has studied real working volumes, with clearances over 10m high for circus acts, as well as the integration of specific techniques, integrated into the grill overlooking the stage area and the fasteners on structures, both vertical and horizontal. Incredible working comfort.

As for the spectators, they benefit from simple but well-designed stands, curved around the stage in a semicircle. Ergonomics is thought out in the visual space arranged in front of the bleachers, so that the spectators have a perfect view of both the stage and the air above it, so that the acrobatics are clearly visible, in a comfortable way.

Ergonomics also lies in the trick, that of providing the underside of the bleachers with another use: that of a meeting room, using the reception tables, in the shape of G, which can be joined, which then form a meeting.

## Quality of life and services

Most of the architectural and material choices have been thought out in order to benefit the well-being of circus users, both for the staff and for the artists or even for the spectators. From the ergonomics of the bleacher for some and the workspaces for others, the adapted and anti-epidemic ventilation, the study of the contribution of luminosity (while it is often absent in other scenic spaces), acoustics that limit echoes for maximum comfort for spectators and residents, everything has been designed for well-being. The choice of wood is also in this spirit, and forms the starting point: the principles of biophilia, admitting that visual wood, natural materials, promote well-being and concentration.

The quality of the interactions between the occupants of the circus and the community is an important point of the project. Indeed, the Project Owner, Latitude 50 is a pole of circus and street arts. Historically, these art forms were far from being recognized, artists being seen more as acrobats than artists. Inclusion is already recognizing these artists in their own right, giving them a place to work for their creations and rehearsals, and not just a tent to put on a show. This is a successful and widely recognized inclusion, because the village of Marchin is now recognized in the circus world.

This recognition is the success of Latitude 50, but also of the town hall, very involved in the project, and of the desire to live together. The circus is part of a larger project, including a circus school. This school welcomes children and young adults from the region, and forms the link between all. Like the circus bar, where the inhabitants of the region gather willingly, whether there are performances or not: it is village life that is reborn around the project.

## Carbon

### General infos

The main point of the project is that the structural materials, facing, closures, are made of wood. There is a CO<sup>2</sup> sequestration of at least 208 tonnes thanks to this choice. By also choosing materials made in short circuits, in a local factory.

In addition to the main materials, it is necessary to highlight the low energy used for the building. Natural light is reconsidered (not a dark rehearsal room), used, heating and air conditioning are produced by a VMC linked to a heat pump. These energies will be mainly supported by the production of renewable energies via photovoltaic solar panels (in progress).

Finally, building with carbon in mind also means doing eco-design, thinking about scalable and removable volumes. This makes it possible to anticipate possible deconstruction. And at the end of the building's life, to ensure that it can be easily dismantled, in order to re-use the various materials as well as possible. To anticipate is to succeed.

### Carbon sink

Wood, a biosourced material, is used for structural materials, facing, closures, but also bleachers and furniture. There is a CO<sup>2</sup> sequestration of at least 208 tonnes thanks to this choice. By also choosing materials made in short circuits, in a local factory.

The CLT panels are labeled biosourced (98%). Like columns and beams, CLTs benefit from an LCA to calculate their environmental impact exactly.

The interior fittings, made by re-use, are also made of biosourced materials, since they are made from glued CLT wood panel waste.

## GHG emissions

GHG in use : 76,00 KgCO<sub>2</sub>/m<sup>2</sup>/an

Methodology used :

PEB Report

## Life Cycle Analysis

### Material impact on GHG emissions :

Les matériaux de construction principaux, à savoir la structure et les murs d'élévation, les fermetures et le parement extérieur sont en bois, et ont été fabriqués à moins de 100 km du lieu de construction.

Cela diminue considérablement l'émission de GES pour cette construction. D'une part car les matériaux de structure bois, issus de forêts locales (250 cm) ou européennes, demandent une énergie grise (fabrication) bien moins importante que pour les matériaux pierreux, ou pétrosourcés. D'autre part, car le principe du circuit-court impliquant la fabrication des matériaux près du lieu de construction, diminue drastiquement l'impact transport de l'usine vers le chantier, sans intermédiaire qui plus est.

### Eco-design material :

The circus mainly includes eco-materials. Only the foundations and the insulation are not considered ecological.

Nevertheless, concerning the foundations, environmental efforts deserve to be singled out. Indeed, the stabilization under the foundations was carried out by liming the soil present on the site. This made it possible to work with the material on site, to generate only a little evacuation, but above all not to carry out massive additions of materials.

Thus, the circus is "all in wood", both in its structure, in its facing and its closures, but also in its layout: technical walkways, bleachers, etc. are also made of wood. This allows an interesting carbon sequestration, since we are talking about a volume of wood of at least 278 m<sup>3</sup> (structure, walls and bleachers), and therefore a carbon sequestration of at least 208.5 tonnes of CO<sub>2</sub>.

The glued CLT walls have received the biosourced label (98%), and have been subject to ACV and DEP (B-EPD in Belgium, present in TOTEM + FDES in France, present in the INIES database).

The glulam beams were also the subject of an LCA and DEP (B-EPD in Belgium, present in TOTEM).

## Contest

### Reasons for participating in the competition(s)

The Marchin circus has its place in the Green Solutions Awards competition. This is an atypical building, both in terms of its function as a permanent "circus" and its architecture, which was intended to be resolutely sustainable from the outset.

The eco-design, led by the architect and the company, led to a mix of construction systems in wood, in order to minimize materials, to rationalize wood, while providing for the building's scalability, and - in the end of life – to be able to dismantle it easily with the reuse of materials. Of course, taking into account the maximum longevity of the structure, including easy maintenance.

Biosourced materials have been favored for structural elements, closures and facing. Local and European materials have been favored, materials with environmental labels and ACV / FDES-B-EPD. These materials presented innovations that made it possible to exceed the regulations in force in Belgium in order to adapt to the project.

Wood was the subject of a direct choice to increase the comfort and well-being of the occupants, with notions of biophilia in the overall architecture of the building, which makes it possible to integrate a societal notion in addition to environmental.

To crown this environmental desire, elements of furniture have been re-used, using CLT waste, in order to avoid using new materials and thus reduce the environmental impact of the fittings.

