De Schatkist Primary School Extension Brussels, Belgium

Today, the primary school De Schatkist (Flemish for Treasure Chest) is located in the former office building in the heart of an industrial site in Haren, Brussels. Rather than merely adding classrooms, the renovation and extension focused on creating a safe, homely environment for children which was made possible with the use of Sylva™ CLT Rib Roofs.

In this case study we interview the Project Engineer, Pierre Eyben from NEY & PARTNERS / WOW on their experience of working with Sylva™ elements.

NEY & PARTNERS is a renowned multidisciplinary engineering and architecture firm founded in 1996 by Laurent Ney. One of their unique divisions, 'WOW Engineering' specialises in timber engineering and collaborates closely with industry partners to offer comprehensive services from design to completion. They have a strong reputation for their handling of complex geometries and structural analyses.

Project overview

New volumes were added around a courtyard, creating a cocoon-like feel with a welcoming look for the neighborhood. A new wooden section with six sloped roofs was built perpendicular to the street. This new area includes a multipurpose hall, classrooms, a library, and a daycare center. The whole building is made of mass timber, using a mix of timber frames and Sylva™ CLT Roofs, with all the wood visible inside. Under these roofs are the classrooms, and the space in front acts as the school's main entrance. The large distance to the garden wall and site boundaries allows for an outdoor classroom.

Efficient construction with Sylva CLT Rib Roofs minimized both building time and inconvenience for the school. The open ground plan improves the connection between classrooms, outdoor spaces, and the main entrance area. The support structure allows flexible use and can be sectioned off, making the building useful even after school hours, turning De Schatkist into a community hub.

Interview with Project Engineer, Pierre Eyben with WOW Engineering

Specification Process

Stora Enso: At the early design stages, how was the decision made to use Sylva CLT Rib Roofs? Did it originate from the engineering team, the architect, or a collaborative discussion?

Pierre Eyben: From a collaborative discussion, but the idea was introduced by us, with regards to the span.

Stora Enso: Was Sylva CLT Rib specifically chosen to accommodate unusually long spans, or were there other key factors?

Pierre Eyben: Mostly spans, but the architects appreciated the look and possibilities to incorporate techniques and acoustic absorbing material.

Stora Enso: Were alternative materials (e.g., traditional CLT, steel, or concrete) considered before deciding on Sylva CLT Rib Roofs? What were the pros and cons of those alternatives?

Pierre Eyben: From the very beginning, we wanted to produce a massive timber construction with regard to the CO2 footprint of the building and the unique look and feel timber provides. Alternatives only started to sprout out when we received the first prices, which were quite beyond our estimates, due to the COVID-19 era and the uncertainty around timber prices A concrete solution with prefab Roofs had been studied but didn't prove to induce major economic benefits in the end. Therefore we had to redraw the project a little bit and reduce de footprint of the building to get within the budget all the while keeping the massive timber structure.

Stora Enso: What were the final deciding factors that confirmed Sylva CLT Rib as the best choice for this project?

Pierre Eyben: Architectural possibilities (incorporation of techniques, acoustics, look and the optimized ratio mass/span.

Design Considerations

Stora Enso: How did the ribbed Roof system affect connection details? Were there any unique engineering challenges in designing supports and joints for this system?

Pierre Eyben: Yes for the fire we couldn't use the classical metallic dovetail connection (16cm width for R60 wasn't enough). We indeed had to come up with a custom-made solution which proved to be efficient enough, especially for the construction team who liked it. The solution consisted in using more of the CLT Roof than rib to transfer the shear load.

For those new to Sylva CLT Rib Roofs, being constructed from solid timber, inherently possess significant fire resistance. Whether protected or unprotected, these Roofs consistently achieve high fire resistance ratings. Extensive research has validated the fire performance of these Roofs, that they can maintain their full rigid composite action under standard fire exposure, both with and without a fire protection system with the correct design and application). Read more about fire performance.

Stora Enso: What were the key load-bearing considerations when working with Sylva CLT Rib in this project?

Pierre Eyben: Optimization of the mass/span ration while keeping a certain minimal mass for acoustics, R60 for fire (Rib width of 16cm), vibration, etc.

Stora Enso: Did the visual quality and exposed aesthetic of Sylva CLT Rib influence the structural detailing in any way?

Pierre Eyben: We didn't want to have visible connections, the whole aim of the design and connection detailing was to provide a building with visible timber inside.

Tools, Knowledge and Collaboration

Stora Enso: Was there a need to develop new design methodologies or testing procedures for working with Sylva CLT Rib Roofs?

Pierre Eyben: The Sylva CLT Rib Roof is incorporated in the CLT designer from TU Graz which we used to verify stiffness.

Stora Enso: How did the engineering team address acoustic and fire safety considerations with Sylva CLT Rib? Were these challenges different compared to standard CLT solutions?

Pierre Eyben: Not much different, but the bearing of the Rib was a challenge.

Stora Enso: Was this the first time the engineering team worked with Sylva CLT Rib? If so, what was the biggest learning curve?

Pierre Eyben: We use it consistently on projects with spans > 7m

Integration within the building

Stora Enso: How does Sylva CLT Rib interact with HVAC systems, electrical, and other MEP (Mechanical, Electrical, and Plumbing) distributions?

Pierre Eyben: We have to have an integrated design strategy with all techniques on board in the early design stages.

Stora Enso: Did the use of Sylva CLT Rib Roofs require changes in how these systems were integrated into the building?

Pierre Eyben: Of course, either you go along the Ribs, or under the Ribs. The architecture also was organized with more vertical distribution and less horizontal distribution to facilitate and avoid bad interactions.

Stora Enso: Were the distribution layouts designed differently than they would have been for a traditional CLT or concrete structure?

Pierre Eyben: Yes, but the key to address this is team work from beginning until the end.

Final reflections and lessons learned

Stora Enso: From an engineering perspective, what were the biggest benefits of using Sylva CLT Rib in this project?

Pierre Eyben: We very much liked the look of it. The stiffness is unique considering the loads and the spans.

Stora Enso: Would you recommend Sylva CLT Rib Roofs for similar large-span projects? If so, in what types of buildings?

Pierre Eyben: It seems most appropriate for schools and offices where larger spans are needed. Nevertheless, we could imagine residential buildings with big spans, heigh ceilings, and Ribbed Floors, but the price would make it a second choice.

Special thank you to Pierre Eyben with WOW Engineering for the interview.

Carbon footprint of Sylva CLT Rib Roof elements

Total greenhouse gases produced to manufacture 15 tonnes. Source: 702 x 21.8 = 15 415 kg -> 15 tonnes kg CO_2e/m^2 (based on 3rd party verified EPD)

Would you like to view more projects with Sykva Ribbed Floors and Roofs?

Hoyt Under Taket Climbing Centre

Satama Event Centre

General

Delivery year

2023

Building type

Education

Area (m²)

3,100

Units

1

Photo credit: CLT-S

StoraEnso

Products

Products and Services

Sylva CLT Rib Floors, Sylva™ CLT Walls, Sylva™ CLT Floors and Roofs

Product quality

702 m² RIb Panels | NVI and INV

Product volume (m³)

233

Team

Developer

SMDB De Schatkist

Architect

a2o Architecten

Structural Engineer

WOW engineering

Timber Engineer

WOW engineering

Others

Total construction development cost (€)

4,600,000