

Living Campus Leoben

15.01.2019 / Österreich / Victoria Binder

Building construction



Factbox

Client: Rottenmanner Bau- und Siedlungsgenossenschaft

Contractor: PORR Bau GmbH

Contract Type: Generalunternehmer

Scope: Construction of a 4-5 storey residential building

Contract Volume: 10.13 million euros

Construction Start: 03/2017

Construction End: 07/2018

Location: Leoben

Sustainability in practice in former mining city

In a construction period of only 17 months, PORR built a multi-storey dormitory with student and lecturer apartments, guest rooms, start-up offices and a café.

Engaging PORR Design & Engineering GmbH at an early stage enabled efficient use of prefabricated components, while intensive planning turned the Living Campus in Leoben, Austria, into a showcase project for sustainability in practice.



The Living Campus is divided into two curved axes and is located directly on the River Mur in the immediate vicinity of the city centre. Source: Hermann Harg Junior

Background

Just two years ago, there was a yawning emptiness next to the famous Brandlwiese in Leoben. Today, a modern residential home for 280 people stands here, which not only boasts a DGNB certificate in gold, but is also a real architectural highlight of the mining town. The building is divided into two curved axes. The shorter, four-storey axis is orientated towards the Mur in the west, while the main part of the building in the east extends over five storeys. The centrepiece is a large glazed atrium. Attractive flat-roof terraces have been created with recesses in the western part of the building. The idea for this residential home has been around since 2015 and after two years of intensive planning and a sale of the ready-to-build project to Rottenmanner Bau- und Siedlungsgenossenschaft, work began in March 2017. PORR Bau GmbH, Styria branch, acted as the general contractor. The contract is worth EUR 10.13 million.



Technical quality and process optimisation go hand in hand with the concept of sustainability.

Victoria Binder
Construction engineer, PORR Bau GmbH

Close cooperation with PDE

PORR Design & Engineering GmbH (PDE) was on board the project from the very beginning and was able to significantly optimise the planning with its expertise. The structural engineering and construction management teams were the key factors in being able to construct the building in this form using precast and brick construction methods and semi-precast concrete elements. This early and close collaboration enabled the use of prefabricated parts to be maximised and the time-consuming in-situ concrete construction method to be minimised.

In order to achieve the highest international building certificates required by the client, intensive and comprehensive planning was necessary. This ranged from energy and resource efficiency to the origin of the building products, auxiliary and installation materials used, indoor air quality, safety, comfort and cosiness and finally the building's suitability for conversion and third-party use. The result of these efforts is a DGNB certificate in gold, which was presented during the opening ceremony.

Difficult soil conditions

Right at the start of the work, the ground conditions and the discovery of aerial bombs led to delays in the foundation work. In order to ensure that the ground had sufficient load-bearing capacity, dynamic impulse compaction of the existing subsoil was carried out. This required a total of 320 compaction columns, which were distributed under the shallow foundation using a grid system calculated by the structural engineering department.

Once the ground had been successfully stabilised, the usual shallow foundation work could begin. No major excavation work was necessary, as the site is relatively level and only around a third of the building has a basement.



Dynamic pulse compaction was carried out to improve the soil conditions. Source: PORR



The exterior walls as well as the load-bearing walls in the stairwells are made of vertically perforated bricks. Source: PORR

Making good things better

In Leoben, PORR relied on a structural system that had already been successfully used in the past and was further optimised by the site managers and planning team for this project. The exterior walls, as well as the load-bearing walls in the stairwells, are made of 25 cm vertically perforated bricks. Thanks to early coordination of the floor plan, only a few round reinforced concrete columns were required as load-bearing elements in the large wing-shaped building components. As a result, all floor slabs could be designed with special punching shear reinforcements without the need for joists.

The floor slabs consist of loosely reinforced semi-precast concrete elements, which were supported on the load-bearing external walls and internal reinforced concrete columns with in-situ concrete reinforcement in the slab thickness in the punching shear area. The reinforced concrete supports were integrated into the drywalls in the final construction and thus made invisible. This design variant had a consistently positive effect on both the runtime and ultimately the costs.

To ensure that this high proportion of prefabricated elements could be processed on the construction site without any problems, PORR had to be involved in the planning at an early stage in order to adapt the shape and structure of the building to the requirements of this construction method. In addition, the site manager had to coordinate the planning, approval, delivery and installation of the concrete construction elements.

Good organisation

The building is around 115 metres long at its greatest extent. To compensate for this length, three building expansion joints were installed in the shell, dividing the entire building into four construction sections. Both the construction schedule and the construction site equipment, and thus practically the entire construction process, were organised according to these sections. The master builder work was completed first in the west section, then continued from the

south section via the centre section to the north section. This sequence was followed for all other trades and the north section was completed as the last construction phase. Thanks to this well thought-out construction site organisation, only one fast-erecting crane with a rail-mounted trolley was required during the entire construction work, despite the large dimensions of the building.

Visual eye-catcher

The five-storey section of the building was finished with a traditional flat roof and the four-storey section was given an extensive green roof in order to remain true to sustainability on the roof as well. The building envelope was designed as a thermal insulation composite system. The architect designed the façade surface with colourful highlights and window surrounds. With this play of colours, the building stands out once again from the other existing buildings in Leoben and is an eye-catcher even from a distance.

As the living spaces are repeated in terms of dimensions and measurements according to a logical system, the building extension could be realised quickly and continuously in phases. All other trades followed on seamlessly from the drywall construction without any major delays.



The roofs were designed as flat roofs. The lower part of the building was provided with an extensive green roof. Source: PORR

Sustainability - lived practice at PORR

The fact that the concept of sustainability is also of great importance in the construction industry became clear once again in this project. With the support of PDE's sustainability department from the start of the project to the handover of the property, a high degree of resource and energy efficiency, cosiness and comfort for the building's users as well as cost-effectiveness were guaranteed throughout the entire life cycle. As the general contractor, PORR had to pay particular attention to technical quality and process quality during realisation. Particularly when working with subcontractors, the use of suitable materials and products had to be emphasised and the materials and products ultimately

used had to be precisely checked and approved. To facilitate this effort, PORR was able to count on the support of PDE throughout the entire duration of the project. It acted as a consultant during project development, planning and the entire project process. PDE also prepared a life cycle assessment of the construction and utilisation phase and carried out all the building physics investigations, tests and measurements required by the ÖGNI for certification. These included daylight simulation, pollutant measurements and an on-site blower door test. All of these points had to be planned technically and in terms of time during the construction of the building.

Certificate in gold

Achieving the DGNB Gold certificate not only required bright minds in the planning phase, but the sustainable construction of the building was also taken into account throughout the entire construction process. Hand in hand with the planning office, all the professionals involved in the construction and with the

additional consultation of one or two experts, this vision was achieved with only minor hurdles. All PORR employees involved can look back on an exciting and ultimately successful project realisation.

320 poles

Compaction poles

430 t (approx.)

Reinforced concrete reinforcements

Technical data

Gross floor area	9.473 m ²
Built-up area	1.993 m ²
Foundation type	Flat foundations
Concrete used	3.969 m ³
Vertical coring brickwork	4.950 m ²
Number of apartments	164 Einzelzimmer, 58 Doppelbettzimmer
Number of offices	14
Car parking spaces	58
Bicycle parking spaces	150
Certification	DGNB-Zertifizierungsstufe Gold