

TEAM 01

KEEPING THE SPIRIT OF WUPPERTAL



DIGITAL DECATHLON

TEAM 01

KEEPING THE SPIRIT OF WUPPERTAL

Keeping the spirit of Wuppertal

Ground floor 1:400

First floor 1:400

Wall section 1:100

Section 1:500

Site plan 1:2000

The idea
The inspiration for the project is the city of Wuppertal.
The design is based on characteristics of the city like the Wupper river and the train.
Flowing and delicate form of the river + angular and dynamic train railway construction creates contrast.

Team 1: Natalia Malinowska, Martyna Bulska, Chiara Benedetti, Hüseyin Bek, Miya Taurainen

UNIVERSITY OF AMSTERDAM
UNIVERSITÄT WUPPERTAL
Karelia
UNIVERSITY OF TRIESTE
Politecnico di Milano
NA DAAD
UNIVERSITY OF WÜRZBURG
EUROPEAN UNION

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URBAN GARDEN RELOADED

URBAN GARDEN RELOADED

The conceptual approach of the design is rooted in the necessary sustainability considerations that the cycle space demands. After analyzing the existing building, we identified the components worth preserving and designed the project around these. The building accommodates a variety of uses, which have in common the attempt to generate meeting and community areas, as well as outdoor spaces for the public in order to enhance the value of the site. In order to bring back the urban gathering that existed in the past, the building incorporates a big urban parking area inside the building, creating a special atmosphere when entering the building. The possibility of growing and selling local food encourages sustainable living.



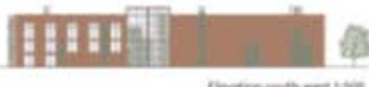
View from the Nordbahnhofstrasse



Room program



Detail



Elevation south-west 1:500



Section BB 1:500

Section AA 1:500



Section CC 1:500



Ground floor 1:500



First floor 1:500

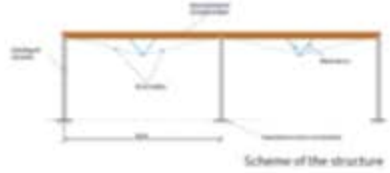


Second floor 1:500

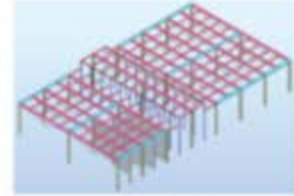


Wood Construction

The main idea for the structure is to keep RC columns from existing building and to use wood as material for a part of the structure. Because of the large space between existing columns, steel was chosen up with ribs of wooden roof trusses. Wooden beams reinforced with steel joists. With this solution we manage to reduce the size of the wooden beams so that roof structure appears lighter and bigger.



Scheme of the structure



Structural model in static program




Visualization of the roof structure

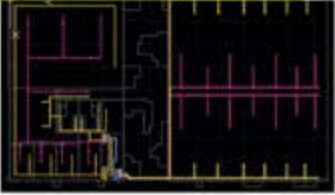
Team 02: Finn Bruhn, Macey Kollongoski, Anika Pirschner, Almut Timmer




URBAN GARDEN RELOADED



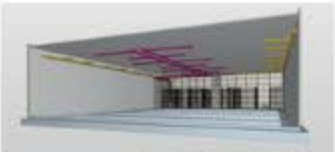
Air handling unit



Ventilation plan




Visualisation of the multifunctional hall

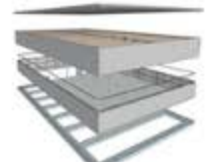


3D view of the ventilation pipes


Model Checking



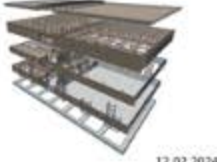
10.10.2023




13.10.2023



08.12.2023




12.02.2024




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Product Traceability




Local companies




Bricofloor



Innovative products




Snahetta



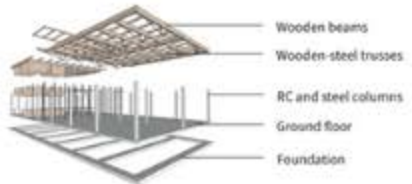
One Click LCA

Datasheets from One Click LCA



Siniat

Construction Scheduling



- Wooden beams
- Wooden-steel trusses
- RC and steel columns
- Ground floor
- Foundation

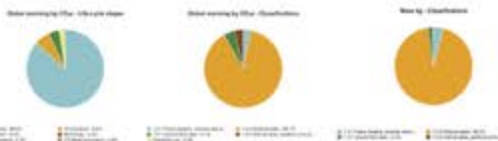
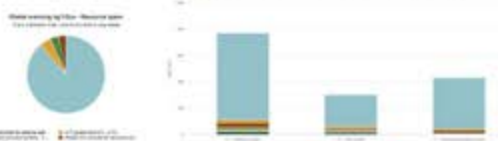
Order	Task	Start	End	Task Type
1	Foundation	13.01.2024	13.03.2024	Construct
2	Ground floor	13.03.2024	13.04.2024	Construct
3	RC columns	13.04.2024	13.05.2024	Construct
4	Steel truss beams	13.05.2024	18.05.2024	Construct
5	Roof trusses	18.05.2024	02.06.2024	Construct
6	Second order beams	02.06.2024	05.06.2024	Construct
7	Interior columns and walls	05.06.2024	08.06.2024	Construct
8	Roof truss in urban garden part	08.06.2024	08.06.2024	Construct
9	Roof columns	08.06.2024	08.06.2024	Construct
10	Second order beams in urban garden part	08.06.2024	08.07.2024	Construct


Life Cycle Assessment

1 106 tonnes CO₂e

3.4 kg CO₂e / m² year


€15,291.4 Social cost of carbon



Datasheet linked in the model

Team 02: Finn Braun, Maciej Kołodziejczak, Annika Porschen, Akusti Toivonen



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CREATIVE KNOT

Creative Knot
cultural center in Wuppertal



site plan



rendering



elevation



section




Ground Floor



First Floor



facade detail



Building Product Traceability



DALLUX

Team 03: Pawel Anandt, Lorenzo Baroni, Niko Norrbock, Setayesh Rostami, Teresa Stengels










Simulation

Energy analysis

Daytime

- Leading internal equipment lighting
- Daylight

Evening

- Internal equipment lighting
- Daylight

Autodesk Revit

Model Check and BIM coordination

Architectural model

Structural model

MEP model

Clash Detection

- Example Clash: no clear opening in wall
- Example Clash: MEP component and floor opening clash
- Example Clash: wall and beam
- Example Clash: beams and glass for air
- Example Clash: architectural and structural walls differ
- Example Clash: heating and ventilation pipes
- Example Clash: heating pipe and column

BIMcollab **BCF MANAGER** **DALUX**

Digital Decathlon

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Construction Scheduling

Autodesk Navisworks

Construction

Steel assumptions

- vertical concrete columns and beam floor structure with fixed end connections
- steel support structure in the form of a planar slab
- use of vertical elements of the existing building
- use of vertical elements with the aim of creating a double structure
- horizontal structural floor supports by precast concrete in high strength concrete
- connection based on fire resistant welded steel structure

Autodesk Revit **BIMvision**

MEP

MEP assumptions

- ventilation system with heat recovery
- air distribution is partly displacement and partly mixing
- heat recovery from ventilation with heat pumps
- heat pumps are also used to cool the building
- heating and cooling is provided by ceiling radiant panels
- water fittings are contact free and water saving

Autodesk Revit

Life Cycle Assessment

Global Warming Potential (GWP) CO2e

Global Warming Potential (GWP) CO2e

Global Warming Potential (GWP) CO2e

Global Warming Potential (GWP) CO2e

One Click

Team 03: Pawel Arendt, Lorenzo Baroni, Niko Norrback, Setmayesh Rostami, Teresa Stempali

TEAM 04

TEXTIL ROUTE



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Architecture project

Performance spaces
Café/Relax Area
Art, Exhibitions
Storage space x 5.0.
Technical room
Services
Textile Museum
Workshop Area
Shop/Temporary retail
Partition
Glazed walls
Ramps
Open space
Built volume

Construction project and wooden element

400x900 concrete beams
Precast concrete
Structural framework: 12x12m
40x40 reinforced concrete pillars
Wooden slats
Timber frame/insulation

Low-tech sustainable smart building technologies

Rain harvesting system on the roof recycling water

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D04: MODEL CHECKING
Quality analysis and structure of the rulesets.

D05: BIM COORDINATION and COMMUNICATION

Issues per status
Issues per milestone
Issues per priority
Issues per type
DO-Team 4
117 Issues

D06: CONSTRUCTION SCHEDULING

Timeline Group 04

D07: LIFE CYCLE ASSESSMENT
The building's environmental impact

**Textile Route
A Cultural Center in Wuppertal**

The disciplines involved in the design process

The scheme's focus is on Wuppertal's textile industry heritage. A new cultural space that is rehusing Wuppertal's permanent existing textile museum and is providing additional changing exhibition spaces. The concept evolves around a ramp wrapping around the building as a textile thread. The ramp works as an in-between space between the city and the exhibition. The ramp also provides access to the roof space and it becomes like a public piazza.

D08: SIMULATION
Wall integrated photovoltaics, energy efficient building

Annual Overview
10.0

D09: BUILDING PRODUCT TRACEABILITY
Linking products from local producers, sustainable products


TIMBER WALL FROM DERIX
Available sustainability certificates
HANDRAIL FROM TREDA FREWA
Available data sheet

D10: REPORTING

Team 04: Anastasia Antoniadou, Anna Sturnik, Christine Gredl, Maria Francesca Perri, Piotr Wojnar


CUBE SYSTEM

D1: ARCHITECTURE




The Culture project involves the transformation of an empty warehouse in Wuppertal into a cultural center. The 4,000 square-meter hall, close to the A46 freeway, is part of the structural transformation of an industrial area. The aim is to create an identity-forming, appealing place for people of all ages and social age groups and social classes. The cultural center is intended to be a place of encounter, transparency and openness. It is planning flexible, multifunctional rooms for events, work or meetings, as well as a mixed program of rooms program that integrates outdoor and indoor spaces.

D10: REPORTING



D2: CONSTRUCTION

Construction of the Cultural Hall is a combination of steel, reinforced concrete and of course added timber constructional elements including walls, floors, roofs and tops, stairs and beams combined with floor slabs as parts of the new construction. Rather than inner construction which is made mainly of timber, there are two rows of walls added in the northern side of the construction as reinforced concrete walls, serving as bracing walls against side forces to the whole structure such as wind, earthquake or big side impacts during the construction lifetime.



Cubes Structure
Cross Laminated Timber (CLT): is a subcategory of engineered wood with panel product made from gluing together at least three layers of solid-sawn lumber

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Intermediate Floor 1.04
160 mm CLT, PVC flooring, suspended ceiling
Acronym in BIM model: D02-SL-EC-1.04

External Wall 1.06
100 mm CLT, Plaster facade
Acronym in BIM model: D02-WA-CLT-1.03

Intermediate Floor 3.1.12
Sylvia LVL Rib - type Open
Dry screed with gypsum fibre with gravel
Acronym in BIM model: D02-SL-EC-3.1.12

D3: MEP

Heating system

The central heating system is an air system. The heat source is a heat pump that recovers heat from the sewage system and exhaust ventilation. In addition, convection heaters are provided in the bathrooms.

Ventilation system

The ventilation installation system is the main system in the building. Its task is to provide fresh air, heat the rooms in winter and cool them in summer. Air preparation takes place in the technical area through a heat pump and a chiller. With this solution, materials can be saved on other installations.

Control systems

A control system based on temperature, CO2 level and humidity was envisioned.

Plumbing and sewage systems

The sewage system will be an underfloor installation. The system will be the bottom source of the heat pump.

Building Management Systems

A BMS system is provided for the building, allowing monitoring of system performance and automatic fault detection

Electrical & lighting systems


The source of electricity will be a PV installation located on the roof of the building. In addition, space has been provided for energy batteries.


Air conditioning system


The source of cooling is a chiller that prepares chilled water for cooling ventilation air. The heat discharged from the chiller can be used for the purpose of hot water preparation.

Water systems

The source of cold water is the municipal network, hot water will be prepared in a heat pump. The water system feeds the bathrooms, changing rooms and the catering area. In addition, a rainwater accumulation system is planned for watering greenery.








Co-funded by the European Union


D4: MODEL CHECKING

The first thing we did was to place the model in the BIM modeling software so that we could see if the elements in general appeared, we realized that we had a problem with the definitions of the elements and from there we switched to Solibri so that we could issue a detailed report. After we defined our preferences in the software for receiving the report, we marked and divided responsibility for the various problems that appeared in the model.

Software used to test the model are:
 REVIT
 SOLIBRI
 BIMCOLLAB
 DRIVE PLATFORM




After that, we published the problems and the report in two places, one is in the drive so that everyone has access to the file and a copy of the report, the second form was through BIMcollab where we marked for each the things that he needs to fix and we conducted the chat about each problem separately and followed the progress.




D5: BIM COORDINATION and COMMUNICATION


BIM Execution Plan




Time schedule



Level of Detail



Coding file

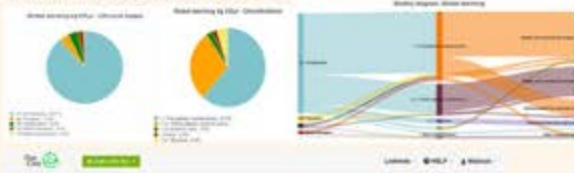



D7: LIFE CYCLE ASSESSMENT

using OneClickLCA


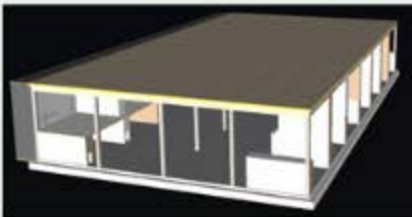
With help of LCA databases of OneClick application, we could measure a roughly calculated CO2e amount of the structure during its life time.

Rather than CO2 produced during the life time, the application also measures a yearly amount of carbon dioxide produced with the given usage of the structure, which is here a cultural gathering hall.






D6: CONSTRUCTION SCHEDULING





D9: BUILDING PRODUCT TRACEABILITY

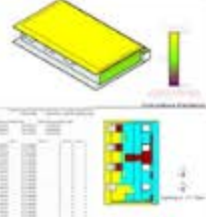


D8: SIMULATION

For the initial solar and light analysis we used a model based on the architectural concept, when the model was simplified to basic forms. We received the data of the model in the form of graphs, diagrams, and tables.



After the first result, another model was made which describes another option for the division of the rooms and the locations, including the distance of the closed spaces from the direct area of the sun's rays, and the use of a wall which is exposed to the sun's rays during most of the day as a surface on which the installation of PV would be possible. Thus the surface area of PV increases by at least 200 square meters.



Team 05: Masoud Abul-Ghameh, Pia Schmitzer, Angelina Stavila, Eyal Ohayon, Bogdanica Przemyslaw

