AKTION 84p10

Production optimization of non-standard construction assembly

Final Report

Activities during the project

The project was structured into main three stages:

1. Workshop at TU Graz 4.11.2019 – 7.11.2019

During this workshop the teachers with the Czech/Austrian students explored the possibilities and membrane structures. The mathematical and geometrical theory was explained to the students. After, small simple structures were created by the students. After the review of these creation, each student work independently under the teacher's supervision to create a more elaborated architectural structure that would at least partially enclose the space. At the end of the workshop these models were reviewed and critiqued. The students also learned energy concepts of buildings. They explored possibilities of different types of waste energy as a heat source. It was decided to design and build temporary "glass house" called Oasis for growing plants utilizing an alternative heat source. At the end of the workshop was also organized tour to visit several architecturally significant buildings in Graz, such as Mumuth, Kunsthaus, etc. The project joined out of the scope of project funding also DI Sebastian Sautter from TU Graz as an expert on energy concepts.

2. Design exploration and finalization

During this time the students worked further on their designs of Oasis. IT was chosen to use waste energy from steam pipes in central Brno. The students consulting teachers VUTBR and TUG design the form and created assembly details. Because the building site was part of a public space, the students created drawing sets in terms of obtaining the building permit.

3. Workshop in Czech Republic 12.12.2019 - 15.12.2019

The workshop took place on the premises of VUTBR. The students built the assembly of the Oasis. Particular issues required solving, such as the membrane splitting and stitching or airflow management.

In terms of design:

The wooden construction holds screen membrane, which closes our oasis to a thermally isolated environment. The two layered membrane was optimized with a help of tools used for parametric design as we needed to achieve specific technical and aesthetic goals. As a result, the temperature provided for the plants inside the greenhouse is around 20°C.

The outcomes of the project

In the project were explored building optimization in terms of energy concept and construction. In January 2020 the 1:1 experimental structure was reassembled at site in Brno, where is going to be presented to public for three months. TUG and VUTBR benefited from the collaboration on the project in terms of exchanging expertise in terms of geometry, construction and energy concepts. The students in the project had the opportunity to experiment with energy concepts and parametric design and create 1:1 assembly in public space.

A reportage from the final workshop was filmed by the Czech national Radio and can be seen here :

https://brno.rozhlas.cz/studenti-architektury-testuji-v-centru-brna-specialni-foliovnik-v-kvetnu-mohli-8141848?fbclid=IwAR2MPGCX1uEHqPrCtv3KKR1juXK-Xr30qerP1O94_fJkdkgRsCaH7WO9d88

In the attachment poster that has been placed on the installation of Oasis.

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OÁZA

Oáza – „izolovaná oblast vegetace v poušti“ - Tiché a klidné místo uprostřed něčeho nepříznivého. Je nalezen zdroj energie v nehostinném prostředí, na kterém vzniká nový ekosystém.

Tato myšlenka nás dovedla k vytvoření objektu před Vámi. Pro nás je zdrojem odpadní teplo z parovodního systému a naší oázou fóliovník. Vzniká tak živé místo uprostřed betonu, oáza ve městě, navzdory zimnímu počasí a nehostinnosti města.

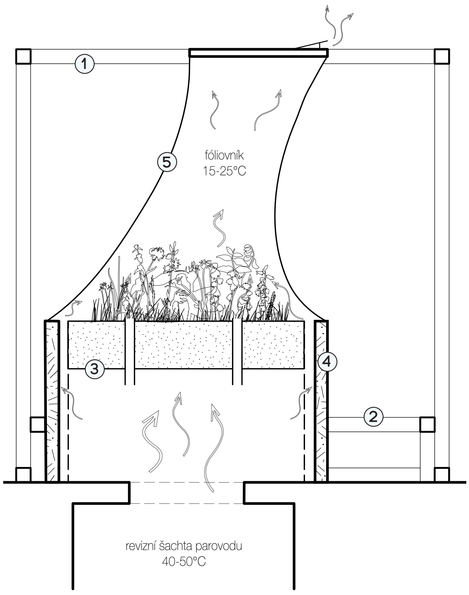
Fóliovník byl navržen s důrazem na technické řešení a správné fungování přenosu energií. Využívá odpadní teplo parovodu, proto je objekt umístěn právě zde - na revizní šachtě parovodu.

Dřevěná konstrukce vynáší fóliovou membránu, která uzavírá naši oázu do tepelně izolovaného prostředí. Proto se rostlinám uvnitř dostane i v zimním období teplot kolem 20°C.

The Oasis – “an isolated area of vegetation in a desert” – a peaceful and quiet place in the middle of rather unfavourable conditions. There is a resource of energy found in stark conditions, where a new ecosystem in created.

This thought led us to creation of the object you can see in front of you. Our resource is the waste heat of the steam system and our oasis is the greenhouse. Despite the freezing weather and inhospitableness of the city, there is a living place situated on a concrete.

It uses the waste heat of steam heating system, which is the reason why the object is placed here on the access chamber. Wooden construction holds screen membrane, which closes our oasis to a thermally isolated environment. The two layered membrane was optimized with a help of tools used for parametric design as we needed to achieve specific technical and aesthetic goals. As a result, the temperature provided for the plants inside the greenhouse is around 20°C.



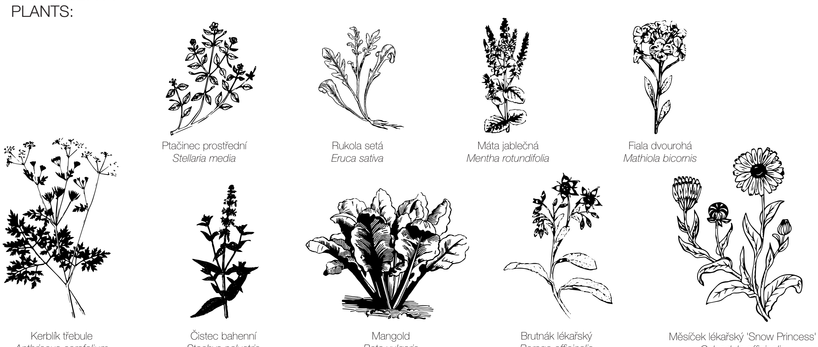
MATERIÁLY A KONSTRUKCE:

1. KONSTRUKCE KOSTKY
- Nosné trámy KVH 100/100 – mořený smrk
- Ocelové lana
2. KONSTRUKCE PODLAHY
- Nosný rošt KVH 100/100 – mořený smrk
- Nášlapná vrstva z OSB desek tl. 15 mm + ochranný nátěr
3. KVĚTINÁČ S HLÍNOU
- Osb desky tl. 15 mm + ochranný nátěr
- Ocelový svařovaný rám – profil 50/50/3
- PVC hydroizolace
4. SENDVIČOVÉ PANELY
- Osb desky tl. 10 mm + ochranný nátěr
- Tepelná izolace tl. 100 mm z textilního recyklátu SK-Tex
- OSB desky tl. 15 mm + ochranný nátěr
5. FÓLIOVÁ MEMBRÁNA
- PVC fólie

MATERIALS AND CONSTRUCTION:

1. CUBE CONSTRUCTION
- Supporting beam 100/100 - stained spruce
- Steel ropes
2. FLOOR CONSTRUCTION
- Supporting base 100/100 - stained spruce
- Step-in layer OSB 15mm + protective coating
3. FLOWERPOT
- OSB 15mm + protective coating
- Supporting construction - steel frame 50/50/3
- PVC waterproofing
4. SANDWICH STRUCTURE PANELS
- OSB 10mm + protective coating
- thermal insulation 100 mm from recycled textile SK-Tex
5. MEMBRANE
- PVC sheet

ROSTLINY:
PLANTS:



O PROJEKTU:

Jedná se o projekt studentů architektury na FA VUT v Brně. Cílem umělecké instalace je demonstrace využitelnosti zdanlivě zanedbatelných zdrojů energie, možnosti navrhování energeticky soběstačných staveb. Projekt vznikl za podpory Česko-Rakouského programu pro podporu bilaterální spolupráce AKTION.

ABOUT PROJECT:

Project was initiated by students from Faculty of Architecture VUT in Brno. Our goal was to demonstrate uses of wasted energy sources and searching for ways of designing off the grid objects.

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Realizaci stavby podpořili:

FA VUT BRNO · SK-Tex · TEPLÁRNY BRNO · svensson · TU Graz