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PROBLEM STATEMENT

TECHNICAL RESEARCH

DESIGN STRATEGY

FUNCTIONAL SPATIAL DESIGN

ROOF DESIGN

CONSTRUCTION PROCESS

CLIMATE STRATEGY

VISUALIZATION

OTHER DRAWING
P4 Presentation
LACK OF CONTACT WITH THE CITY CENTER DETOUR.
CLIMATE PROBLEM AND LACK OF PERMANENT FUNCTION
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C. Joint Exploration
The advantage of this system is that it could be easily manufactured and it also could be developed further: adding the cladding layer (upward) and hanging (downward) the structure underneath the timber roof construction.
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What is lack in this area is Public Space and the Leisure space. Where the residential people around could get together. The Culture Center and the Market is the best choice for the people who work and live around.
### PROGRAM AMBITION

Adding the new function (Market and Culture Centre) into the building. At the same time, keeping the activities already happening still possible.
ONE CHARACTERISTIC OF VANGENDT HALLEN IS BUILT IN PHASE, HAS A VERY STRONG WALL DIVISION BETWEEN THE HALL 3 AND HALL 4.
THE CIRCULATION LAYER ON THE ROOF LEVEL

ANOTHER CHARACTERISTIC OF VANGENDT HALLEN IS IT HAS VERY STRONG BEAM FOR TRANSFER GOODS, WHICH COULD BE USED AS A KIND OF LOAD BEARING STRUCTURE.
Design Strategy

THE REPLACING THE ROOF AND THE FUNCTION AMBITION COME TOGETHER TO CREATE A NEW LAYER INTO VAN GENDT HALLEN, WHICH IS QUITE AN EXISTING PROPOSAL.
The foundation of van gendt hallen has some risk. So for the sake, I will add new steel columns for supporting the roof and the new floors, I add into the factory.

OVERALL DESIGN QUESTION IS HOW TO MAKE VAN GENDT HALLEN DYNAMIC BY ADDING A NEW STRUCTURE (COLUMN/VOLUME AND ROOF) INTO IT?
This image shows why I want to put the column just between the existing column. By doing so, I could keep the power of the truss to on the roof terrace.
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REPLACEMENT

DESIGN A NEW ROOF REPLACE THE WINDOW OF THE FACADE INTO THE OPENABLE ONES.
ADDING SPACE

THE HALL 1&3 ADD THE PLATE IN AIR FORM THE MARKET SPACE AND
THE HALL 4 AND 5 ADD THE BOX FOR THE EDUCATION CENTRE
Due to the daylight necessity and the fire safety requirement, cutting the volume also gives more interesting space.
THE CIRCULATION LAYER ON THE ROOF LEVEL

If we want to create a new layer—roof layer, the circulation system have to be there, I create two circulation loop on the existing steel beam.
THE STAIRCASES AND ELEVATORS

THE STAIRCASE AND ELEVATOR ARE IMPORTANT ARCHITECTURE ELEMENT IN ANY BUILDINGS. IN MY CASE, THE ELEVATOR COMBINED WITH THE FAN FOR THE MECHANICAL VENTILATION.
IN THE MODEL WE COULD SEE THE CIRCULATION LAYER ON THE ROOF LEVEL AND THE BOXES I ADD IN THE EXISTING FACTORY HALL.
FUNCTION DIAGRAM AND THE HOW TO CONTROL THE MAN SCREAM.

I CREATE DIFFERENT FUNCTION IN THE HALLS (1/2/3 AND 4/5) SO I USE THE EXISTING BRICK WALL AS THE DIVISION OF THE TWO FUNCTIONS.
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1. ventilation model analysis
2. Principle form of the roof
3. Preliminary form of the roof
4. Final form of the roof
Distribbing the wind too much at the edge of the surface.
Better than the first one, but along the slope, the wind speed still not so high.
Too many curvy make the wind speed on the whole surface become slow down. But the end the wind speeds up quicky.
Too many curvy make the wind speed on the whole surface become slow down. But the end the wind speeds up quickly.
The roof is about 2 or 3 waves on the dominant wind direction.
no obvious distribution of the wind on the surface of the roof. The average wind speed is 7-8 m/s. Some part could achieve more than 12 m/s. This is very helpful for the chimney effect.

Using these parameters for the further development.

The roof should be extend out of the facade for better wind speed.
The principle form of the roof is OK. But we should also learn how to deal with the existing facade. The main facade and the long side facade.
Main facade is a symbol. It's a kind of attitude to this factory not to the others.

Follow the structure. Creating too huge useless vacancy between the existing facade.

Follow the facade. Still has the flexibility to improve the structure. Also the less curvy of the roof will make the materialization possible.
Long side facade is the attitude to others. People have activities there.

People inside the building would not have a good view to the surroundings.

Attractive to the surroundings, show the attitude quite clear. Come to me, please!!!
The Preliminary form of the roof.
Using Kangaroo for a more rational form of the roof.
Materialization the roof.

2. Rain Water Collection.

I hope all the water goes though the roof’s boundary to the gutter. So I don’t need to get water pipe into the building. For this reason, I need to know if there is any point lower than all the points around it. If there is, we need to change the height of the point a little bit.
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1 VOLUME SYSTEM CONSTRUCTION PROCESS

2 ROOF SYSTEM CONSTRUCTION PROCESS

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1. STEEL STRUCTURE AND THE ELEVATOR
2. CONCRETE FLOOR SLIMLINE FLOOR
6. FINISHING LAYER/CURTAIN WALL
The Main Structure Column

D = 400mm

10mm

200mm
The Main Structure Column

Sub-Column for better force transfer

Connection with the roof metal joint.

STANDARD ELEMENT FLEXIBLE IN DIFFERENT ANGLES, THE LENGTH OF THE SUB-COLUMN IS DIFFERENT.
Roof System-Steel Joint

Using the CNC milling system to manufacture the timber box.

1. Plywood Material

3. Use the nail to put them together

1. CNC milling production

4. Tie the tape to consolidate the shape

Maxmimum Dimension: 500mmx3000mm
Roof System-Steel Joint

Using the CNC milling system to manufacture the timber box.

1. Plywood Material

   thickness 50mm

3. Use the nail to put them together

1. CNC milling production

4. Tie the tape to consolidate the shape

Maxmium Dimension: 500mmx3000mm
The Steel Joint in this System also have 3-direction connection. The key point is transform 3d to 2d.

1. Make a model.

3. The radius of the circle and the thickness of the panel.

2. Cut in 2d cutting

4. Welt them together
Roof-Box System Construction

Steel Joint

Timber Box

Plastic Shims

Nut

Screw

Illustration
The Main Structure Column

- EPDM Seal
- Double glazing panel
- Plastic (glue) layer for the glazing
- Metal plate which plastic layer sits
- Metal tube support the cladding
- The Roof Structure Steel Joint
The Main Structure Column

P4 Presentation

Cladding System-Example Analysis

Cour Visconti, Louvre
The Main Structure Column

Tension in two direction

welt on in factory
Connection on different level for the convenience in install.
Tube axis should be together

Metal Plate made in the factory assemble on site.
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1 Climate Strategy Diagram

2 Illustration of ventilation and heating/cooling
**CLIMATE DIAGRAM: SUMMER**

1. Natural Ventilation through the opening of doors and windows
2. Hot air rises and escapes through roof openings driving fresh air in at low level
3. Cool fresh air is drawn in from the river side via undergound ducts
4. Cool fresh air is blown to the top floor level by the fan on the top of the elevator
5. Fresh air go through the box and blown out by the fan on the top of the elevator
6. The opening of the window is according to the dominant wind direction
7. The water pond and the vegetation features shade and evaporatively cool the hall
8. Internal shades prevent overheating at high level
9. Using the laminated glass for the lower radiation such as COOL-LITE SKN 165/165
10. Heat pump pre-cooling system

**CLIMATE DIAGRAM: WINTER**

1. Wind is deflected by facade.
2. Rain collection reused for toilet flush
3. Daylight to heating the hall.
4. Heat reclaimed by exhausted air
5. Heat pump for the pre-heating air
6. The fresh air temperature raised to 8 degree by the soil energy.
INSULATION BOX

underground air tube with pre-heating and pre-cooling system

blow out by mechanical fan in the elevator

blow out by mechanical fan in the elevator

blow out by mechanical fan in the elevator

Floor heating and cell cooling in the insulation box

Local heating system applied in other area such as electric radiator in winter
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1. Circle Steel Column R=200mm
2. Existing Truss in Hall 1
3. Existing Facade
4. Steel-Concrete Composite Floor
5. JPE 1000 Steel Profile
6. Timber Ceiling Panel
7. JPE 600 Steel Profile
8. Green Soil box with drainage layer
THANK YOU FOR YOUR ATTENTION