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Examiner

Examensarbete inom arkitektur, avancerad nivå 30 hp
Degree Project in Architecture, Second Level 30 credits
07 juni 2018
Architecture composed of massive timber elements have recently gained a lot of interest and come with the promise of lowering our carbon footprint. What if prefabricated timber systems could be transported from Sweden to other parts of the world in a sustainable way? These are the foundations for my project. Early on in my thesis work I formulated a series of questions that reflect my interests in climate issues, and also allow me to explore how computerized adaptive componential design can help generate future architectural tectonic expression and of course help to mitigate climate-related issues.

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1. Can standardized timber elements be assembled into a range of components that form larger structures?
2. How can these components adapt to fit over non-rectilinear shapes?
3. What are the size limitations in order to be shipped globally?
4. How is timber perceived at varying scales?
5. How is timber perceived in a large-scale public building?
VISIT TO MARTINSONS

CLT panels loaded on truck

Trussed loading area

SWEDISH FORESTRY STATISTICS

- Natural Forests: 10%
- Managed Forests: 90%
- Spruce: 42%
- Pine: 30%
- Birch: 12%
- Other Deciduous: 7%
AFRICA
3.6% of total FSC-certified area
(7,149,380 ha)
48 certificates

SOUTH AMERICA
6.9% of total FSC-certified area
(13,809,765 ha)
256 certificates

EUROPE
49% of total FSC-certified area
(97,379,841 ha)
706 certificates

ASIA
4.4% of total FSC-certified area
(8,797,194 ha)
239 certificates

OCEANIA
1.1% of total FSC-certified area
(2,643,667 ha)
39 certificates

Total FSC-certified forest area in ha

- 10,000,000 and above
- 7,500,000 - 9,999,999
- 5,000,000 - 7,499,999
- 2,500,000 - 4,999,999
- 1,000,000 - 2,499,999
- 750,000 - 999,999
- 500,000 - 749,999
- 260,000 - 499,999
- 100,000 - 249,999
- 100 - 99,999
- No FSC certified forest

RAW MATERIAL SUPPLY
LOCAL TRANSPORT
MANUFACTURING
PACKAGING
GLOBAL TRANSPORT
LOCAL TRANSPORT
CONSTRUCTION/INSTALLATION
Part I  Concept Development
**WOOD**

- Due to climate change, the planet is heating up.
  - Increased sea level globally
  - Warming oceans fuel extreme weather events
  - Increased affinity of hurricanes, flooding, beach erosion

- Increased desire to live on the beach/waterfront

- How to provide architectural systems that allow life to flourish by the waterfront.
  - 1st system to be studied closely
  - Adaptive to different programs
  - A module of Pare
  - Movable - resistant to extreme forces

- Bones - Connective Tissue - Skin

- Assembly/disassembly system - movable
  - Touches the earth lightly

- How to achieve the strongest light structure with minimal use of materials?

**SKIN**

- A layering of different porosities
  - Subject to climate and privacy needs
  - Subject to site/relationship to context

- The skin allows the buildings with the atmosphere around it. Preparing structures from the context & establishing a relationship to the site.
  - Can it shrink the structural relationships of the building's like the flexibility described in a membrane?

**CONNECTIVE TISSUE**

- Serves as a bridge between the supporting bones and the skin/organ's skin.

- A level of flexibility of elasticity is needed to bind the two skins together which both expand & contract. Flex & bend individually.

- Tensile in the human body

- Max load through bimetal taper to avoid bending

- Flexible/adjustable attachment points

**WOOD IN COMPRESSION / STEEL IN TENSION**
Part I  Design Proposal
To commence my study, I needed a ‘client’ with great exposure to global climate policy making, seeking a large exhibition and conference space to showcase new emerging technologies and connect policymakers from around the globe.

With these considerations, I was able to select a site on the main UN campus grounds in Bonn, Germany where various climate summits are held including the past COP 23 summit and Tanaloa Dialogue.

Located the beautiful banks of the river Rhine, the site is currently occupied by a parking lot, which sits directly adjacent to the temporary event site used by past climatic summits.

The COP 23 event was held late last year in a dreary temporary plastic tent venue, devoid of any architectural expression. I believe that architecture has a vital role to play by setting the stage for global climate strategy talks.

With this in mind, I sought to provide a permanent addition to the UN climatic dialogue, by creating a space that could host future events like the COP 25 and Tanaloa Dialogue summits on the main campus grounds.

DESIGN PROPOSAL
PLAN - FIRST FLOOR
1:200
KINETIC PANEL (CLOSED)

KINETIC PANEL 50% OPEN

KINETIC PANEL 90% OPEN

GLULAM BEAM STRUCTURE

WOODEN SPACEFRAME WITH STEEL FIXINGS

TIMBER ROOF

OVERLAPPING GLUELAM FRAME WITH INNER PLYWOOD LINING

EXTERIOR WOOD SHINGLE SKIN

LINEAR GLULAM FRAME WITH WINDOW INSERT

630mm x 215mm GLULAM COL

180mm x 165mm TRUSSED GLULAM WALKWAY SUPPORTS

165mm x 165mm GLULAM CNR POST

COMPONENT DIAGRAM

NTS
360mm x 360mm 45° TWO MEMBER STEEL FIXING PLATE

450mm x 360mm THREE MEMBER STEEL FIXING PLATE

540mm x 215mm VERTICAL TO 360mm x 215mm HORIZONTAL FOUR MEMBER STEEL FIXING PLATE
CLIMATIC SECTIONS

SUMMER SOLSTICE

WINTER SOLSTICE

13:33

12:25

12:25
BUILDING METRICS

<table>
<thead>
<tr>
<th>Space</th>
<th>Area</th>
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</thead>
<tbody>
<tr>
<td>EXHIBITION SPACE</td>
<td>3360m²</td>
</tr>
<tr>
<td>AUDITORIUM</td>
<td>519 seats</td>
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<tr>
<td>LARGE CONFERENCE ROOMS</td>
<td>1792m²</td>
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<tr>
<td>SMALL CONFERENCE ROOMS</td>
<td>598m²</td>
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<tr>
<td>CAFE / RESTAURANT</td>
<td>127m²</td>
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<tr>
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<td>109m²</td>
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<td>ROOFTOP TERRACE</td>
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<td>LIFTS</td>
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<td>MAIN STAIRS</td>
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<td>TOILETS</td>
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<td>AMBULANT</td>
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<tr>
<td>STANDARD</td>
<td>24</td>
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