HENNEBIQUE SILOS

HYBRID PREFABRICATED SYSTEM
FOR FABRIC FORMWORK FOR
CONCRETE SHELLS

The renovation of the Hennebique silos building.

Architectural Engineering
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P5
Architectural Engineering
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1. context

2. existing situation
   restrictions

3. concept

4. research
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5. design
   circulation
   material concept
   steel additions
   concrete demolition
   office
   market
   hotel
1. CONTEXT
Genova - Panorama e Porto

Porto Antico, 1950
2. EXISTING SITUATION
Maritime Station project

Postcard, 1918
INNOVATIVE CONSTRUCTION

Hennebique construction method

View from the first floor next to the sea
HISTORICAL PHASES
HISTORICAL PHASES
after 1945
Hennebique silos building
The two maritime stations, 1967
Demolished silos building, 2002
UN Studio, 2001
Winning proposal

MVRDV, 2001
Hennebique silos building
Hennebique silos building
WATERFRONT CONNECTION
BUILDING HERITAGE COMMISION

• maintain the facade on the sea side
• keep the central tower as a main characterizing element of the construction
• keep the intervention confined within the existing volume of the building

MUNICIPALITY

• public functions must be 51% of the total surface
• proposed main functions: public services, hotel, market
• proposed secondary functions: private services, shops/retail, local community spaces (max 10%), parkings (not necessarily within the plot)
How is it possible to push the boundaries of architecture, while maintaining the greatest possible degree of feasibility and complying with the restrictions?
3. CONCEPT
Terrazze di marmo
Ignazio Gardella Sr.
1835 - 1886
Terrazze di marmo
Ignazio Gardella Sr.
1835 - 1886
CONCEPT
STEP 0

Existing situation
STEP 1

Split
Articulate
TRAIN GALLERIES
The arcade
Cross cut towards the sea
After demolition
ELEVATION IN THE CONTEXT
SECTION IN THE CONTEXT
PROGRAM

- Rooms and service spaces
- Spa and gym
- Open space co-working
- Office space
- Public terraces
- Restaurants/Bars
- Informal market
Organization and layout
Water management
Climate and air flow
4. RESEARCH
Form studies
## Table 2.1: Comparison of various formwork methods

<table>
<thead>
<tr>
<th>method</th>
<th>amount of manual labour needed</th>
<th>machining and tooling</th>
<th>costs</th>
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HiLo roof, ETH Zurich, 2017
cost breakdown
150/300 €/m²

33%
textile

12%
cable mesh

55%
support structure

Classic fabric formwork
vs
hybrid prefabricated system for fabric formwork
CONSTRUCTION PROCESS

Existing situation
CONSTRUCTION PROCESS

Partial demolition

10-12m
Prefabricated beam
CONSTRUCTION PROCESS

Wire mesh + fabric
Completed roof structure
L cold bent profile
CONSTRUCTION PROCESS

1200x400mm prefabricated concrete beam
L profile to secure the beam
CONSTRUCTION PROCESS

Wire mesh + fabric
over view of the technical elements

- perforated aluminium panel 750x1150mm
- floating floor
- expansion anchor bolts
- steel plinth
- HEB steel profile 260x260mm
- C profile mullions
- fabric formwork (temporary)
- prefab concrete
- beam 400x1300mm
- piping and installations
- earth and gravel layer
- metal grid
- finishing concrete curb
- inspection pit
- filter fabric
- moisture retention layer
- prefab concrete pot
- rain pipe
- irrigation system
- steel cables support (temporary)
- shotcrete 200/400mm
- hard insulation 80mm
- finishing concrete layer 70mm
- polycarbonate skylight
- aluminium profile
- rain gutter
- ventilation grid
- triple layer
OVERVIEW OF THE TECHNICAL ELEMENTS
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Public space as a playground
5. DESIGN
EXISTING/CONCRETE

NOT FIXED ELEMENTS/WOOD

INTEGRATIONS/STEEL

NEW/CONCRETE
Bumpy white concrete
Rough concrete post-demolition
Casted in-situ concrete
Prefab concrete tiles
Main market hall
Zenital light
Sense of scale
Routing
Hotel stairs
Market mezzanine
Support column in the main market hall
Handrail detail
Helicoidal stair in the main hall
Bridge in the main hall
Demolition area <30% than the total area of the wall
Intervention evidence
Absence of the door
irregular door opening after demolition

V-10 scale 1:5
Level 7 (+16.75m)
PROGRAMMATIC FLEXIBILITY THROUGH MODULARITY
Co-working spaces
Sense of perspective
PROGRAMMATIC FLEXIBILITY THROUGH MODULARITY

basic shapes

linear

U shape

O shape

double

dining

expo 1

expo 2
Market stall
Hotel units

scale 1:100
Single unit room - closed
Thank you