TECHNICAL FASCINATION ➔ DESIGN
Content

Technical Fascination
Urban context
Program
Configuration
Detail
Material
TECHNICAL FASCINATION
Ultra High Performance Concrete

UHPC
CONCRETE

REINFORCED CONCRETE

UHPC
CONCRETE STRENGTH
REINFORCEMENT
FIBRE REINFORCEMENT
LOADS

C28/35
Normal force N
1405 kN

UHPC 170/200
Normal force N
5435 kN

400 mm
**ENERGY**

**Megajoule per cubic meter**

- **Ordinary concrete**
  - Prestressing steel
  - Reinforcement steel (incl foundation)
  - Steel Fibres
  - Cement

- **UHPC**
  - Prestressing steel
  - Reinforcement steel (incl foundation)
  - Steel Fibres
  - Cement
RESEARCH

HOW CAN WE USE THE PROPERTIES ACHIEVED IN CONCRETE TECHNOLOGY IN STRUCTURAL DESIGN?
HOW CAN WE USE THE PROPERTIES ACHIEVED IN CONCRETE TECHNOLOGY IN STRUCTURAL DESIGN?

- TECHNICAL FASCINATION
- THEORETICAL FRAMEWORK
- FORM FINDING METHODOLOGY
- FEM ANALYSIS
- RESULTS & EVALUATION
URBAN CONTEXT
STRUCTUUR VISIE AMSTERDAM 2020
- Remaining the rough and industrial character of the wharf
- Expanding the cultural center to become the largest in Europe
- Urban environment in very high density with mix of program
Sail Amsterdam (every 5 years)
Over het Ij Festival (July)
Sundeck Festival (July)
RoboDock
Valtifest
Hiswa water events
Nautical center
Picnic
538 Queensday
Sail Amsterdam (every 5 years)

Over het Ij Festival (July)

Sundeck Festival (July)

RoboDock

Valtifest

Hiswa water events

Nautical center

Picnic

538 Queensday
PROGRAM
“Eventually the NDSM wharf has to develop 10,000 parking spots.”
Werfdeelbesluit
CONCRETE PARKING

IN-SITU

PREFAB

PRESTRESSED

UHPC
“Parking Garage design, construction and operation have always reflected the tension between the goals of private enterprise and the quest for the public good.”

NY Times
DESIGN

- Use UHPC properties in design

- Remaining the rough and industrial character of the wharf

- Creating a integrated hybrid structure

- Remain ramp as festival terrain
Form Study
Form Study
CONSTRUCTION CONCEPT
CONCRETE FRAMEWORK

STRENGTH

FREEDOM OF FORM
Look at the model!
COLUMNS

HUT VAN LAUGIER

HAARZUILENS
COLUMN
COLUMN
COLUMN
### GSA analyses

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<th>Property</th>
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<th>Description</th>
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### Dead Loads

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### Live Loads

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Axial stress at 225 N/mm²

Deformation 2 mm

Mesh works as a core

Mesh with wind load
Steel anchor
Pre-fabricated UHPC console
Tendon concrete anchors
Truss structure
Biological structures
Process
Process

plaatje structuur dat je al hebt
Deformation < 30 mm

Element stress 350 N/mm²
Connection detail bolted connection
CONFIGURATION
Entrance
Multifunctional

Expo

Lounge/Stage
Car Park
Car Park/Events
Market
MATERIALIZATION
Materialization

Reglit Pilkinton glass

Transparent concrete
95% concrete
5% fibers

Fair Faced concrete
Pre-fab concrete gutter
400x600mm UHPC beam
Mechanical system (heating)
Aluminium windowframe
Insulation foam 100mm
Concrete top layer
INSTALLATIONS

Air

Water
IMPRESSIONS
QUESTIONS
The interior spaces are set up with sprinkler installations. The Dutch law does not enforce sprinkler systems in above-ground parking garages.
Wind Load

Wind deformation > 40mm

Stress in beam up to 400 N/mm² -> GTecz concrete at 500 N/mm²

Deformation is -30 mm.