The Maassilo towards a machine for exchange of culture
Working as a link between users, local- and international culture
Introduction

1. The Maassilo | Future plans

2. Position and starting points | Design question

3. Design framework | Site intervention | Program | Approach | Demolition and repair | Experience | Climate | Conclusion
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Adapting 20C Heritage studio questions

What is the **tolerance for change** of these cultural historically important buildings and contexts **in the former harbour area of Rotterdam**?

What is their **meaning** individually and as components of a collection of industrial built heritage buildings **in the context** and planned urban development?
## Introduction

### 1. The Maassilo | Future plans

#### What is there

- The Maassilo
- Future plans

#### What is the problem

- Position and starting points
- Design question

#### Design

- Design framework
- Site intervention
- Program
- Design approach
- Demolition and repair
- Experience
- Climate concept
- Conclusion
Introduction

The Maassilo | Future plans

Position and starting points | Design question

Design framework | Site intervention | Program | Approach | Demolition and repair | Experience | Climate | Conclusion

Stage I - 1910
Architect: J.P. Stok

source: topotijdreis.nl & P1 report
Introduction

1. The Maassilo | Future plans

2. Position and starting points | Design question

3. Design framework | Site intervention | Program | Approach | Demolition and repair | Experience | Climate | Conclusion

Stage I - 1910
Architect: J.P. Stok

Stage II - 1930
Architects: Brinkman & Van der Vlugt

source: topotijdreis.nl & P1 report
Introduction

1. The Maassilo | Future plans

2. Position and starting points | Design question

3. Design framework | Site intervention | Program | Approach | Demolition and repair | Experience | Climate | Conclusion

Stage I - 1910
Architect: J.P. Stok

Stage II - 1930
Architects: Brinkman & Van der Vlugt

Stage III - 1951
Architects: A.G. Postma & J.D. Postma

Source: topotijdreis.nl & P1 report
Introduction

1 The Maassilo | Future plans
2 Position and starting points | Design question
3 Design framework | Site intervention | Program | Approach | Demolition and repair | Experience | Climate | Conclusion

Stage I - 1910
Architect: J.P. Stok

Stage II - 1930
Architects: Brinkman & Van der Vlugt

Stage III - 1951
Architects: A.G. Postma & J.D. Postma

Additions - 1958-1963
Architect: H. Haan

source: topotijdreis.nl & P1 report
**The Maassilo**

How it worked

- **Vertical transport**
  - Ships $\rightarrow$ Pneumatic elevators $\rightarrow$ vertical (mechanical) cup elevators $\rightarrow$ other ships / silos

- **Silo compartments for storing grain**

- **Horizontal transport, where grain is divided over silos**

- **Workfloors**

- **Train tracks around the building connected the Maassilo with the Netherlands**
The Maassilo
Present day use: event location - since 2004

Images: http://www.maassilo.com/zalen-overzicht/
The Maassilo
Spatial system of the current situation
Future plans in the area
Cultural context
Position and starting points

structure = architecture = skin = material
= machine = Rotterdam harbour
Position and starting points

structure = architecture = skin = material
= machine = Rotterdam harbour

Representative of the
development of Rotterdam as a harbour city
Position and starting points

structure = architecture = skin = material
= machine = Rotterdam harbour

Representative of the
development of Rotterdam as a harbour city

the Maassilo is now more an object on its own, more alienated from the harbour and context
Position and starting points

structure = architecture = skin = material
= machine = Rotterdam harbour

future context = cultural harbour instead of economical harbour

Representative of the
development of Rotterdam as a harbour city

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Position and starting points

structure = architecture = skin = material
= machine = Rotterdam harbour

future context = cultural harbour instead of economical harbour

Representative of the development of Rotterdam as a harbour city

building = machine for a variety of grain
becoming a machine for a variety of users and cultural activity

the Maassilo is now more an object on its own, more alienated from the harbour and context
**Position and starting points**

structure = **architecture** = skin = material
= machine = Rotterdam harbour

Representative of the development of Rotterdam as a harbour city

the Maassilo is now more an **object on its own**, more alienated from the harbour and context

future context = **cultural harbour** instead of economical harbour

building = **machine** for a variety of grain => becoming a machine for a variety of **users and cultural activity**

goal : **connecting** context, culture, machine and users
Design question

What role can the Maassilo play in connecting context, culture, machine and users, while enhancing cultural activity in Rotterdam and on an international level?
Design question

What role can the Maassilo play in connecting context, culture, machine and users, while enhancing cultural activity in Rotterdam and on an international level?

By testing to what extent a design for the Maassilo can connect culture, users, the machine and context, both locally and internationally.
Design framework

What is to be achieved on different levels of the design
Design question

What role can the Maassilo play in connecting context, culture, machine and users, while enhancing cultural activity in Rotterdam and on an international level?
**Design framework**

Connecting layers of context, culture, machine and people.
Design framework

Connecting layers of context, culture, machine and people.

Users

Makers, collaborators and visitors
as fuel for the machine

Building

The Maassilo as a machine for culture

Local context

Connecting and facilitating local culture ...

International context

... and facilitating international import and export of culture
Design framework

Connecting layers of context, culture, machine and people.

The Maassilo as a link between users, local and international culture

- **Users**
  - Makers, collaborators and visitors as fuel for the machine

- **Building**
  - The Maassilo as a machine for culture

- **Local context**
  - Connecting and facilitating local culture ...

- **International context**
  - ... and facilitating international import and export of culture
Site intervention
Site intervention

Current situation
Site intervention

Adding parking for cars and bicycles
Site intervention

A park above the parking area
**Site intervention**

Connecting the new infrastructure of the building with the surrounding area
Site intervention
New separate entrances for visitors
Site intervention

Rotterdam's future plans are constantly changing - The Maassilo can have its own water protection around the building with a concrete facade and waterproof doors.
grain as the product

music as the product
grain as the product

music as the product
Program
Program

Three main zones

- Visitors and music
- Visitors and exposition space
- Makers and office space
- Artists lounge areas
- Sculpture gardens and food
**Program**

Individual lifts and stairs for each group of users

- visitors and music
- visitors and exposition space
- makers and office space
- artists lounge areas
- sculpture gardens and food
Design approach
Design approach

Intertwined structure, architecture, skin, material, machine, Rotterdam harbour
Design approach

Intertwined structure, architecture, skin, material, machine, **Rotterdam harbour**

Rotterdam harbour = **local culture**
Design approach

Intertwined structure, architecture, skin, material, machine, *Rotterdam harbour*

Rotterdam harbour = local culture

The cultural function in the Maassilo creates a link between Rotterdam, local culture and international culture (on a social-economic level)
Design approach

Intertwined structure, architecture, skin, material, machine, **Rotterdam harbour**

Composition and outline of the building = **representative** of the search for the enormous scale of Rotterdam as a harbour city

Rotterdam harbour = **local culture**

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The cultural function in the Maassilo creates a **link** between Rotterdam, **local culture** and **international culture** (on a social-economic level)

To create space, do not change or add to the composition of blocks, but **remove what is abundant** and yet unused space: **silo's**
Design approach

Intertwined structure, architecture, skin, material, machine, Rotterdam harbour

Composition and outline of the building = representative of the search for the enormous scale of Rotterdam as a harbour city

The movement of grain through the machine defines the spatial organisation

Rotterdam harbour = local culture

The cultural function in the Maassilo creates a link between Rotterdam, local culture and international culture (on a social-economic level)

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**Design approach**

Intertwined structure, architecture, skin, material, machine, **Rotterdam harbour**

Composition and outline of the building = **representative** of the search for the enormous scale of Rotterdam as a harbour city

The **movement** of grain through the **machine** defines the spatial organisation

Rotterdam harbour = **local culture**

The cultural function in the Maassilo creates a **link** between Rotterdam, **local culture** and **international culture** (on a social-economic level)

To create space, do not change or add to the composition of blocks, but **remove what is abundant** and yet unused space: **silo’s**

To create new **infrastructure**, use the space that lots of grain used to move through: elevators (up) and silo’s (down)
Design approach

Existing situation
Design approach
Situation after demolition
Design approach

New situation
**Design approach**

New program and design

- visitors and music
- visitors and exposition space
- makers and office space
- artists lounge areas
- sculpture gardens and food
Design approach

Vertical movement, lifts and stairs

- visitors and music
- visitors and exposition space
- makers and office space
- artists lounge areas
- sculpture gardens and food
**Design approach**

Central hall and the context
Design approach
Exposition space: the Maassilo exposed
Demolition and repair
Demolition
Demolition
Situation after demolition of silos

source: www.hadnewick.com/project/zeitz-mocaa/
Demolition
Cutting thicker parts with diamond wire cable saws (images below) & double blade saws
**Demolition**

Cutting thinner walls with 1 meter diameter circular saws

Demolition
Polishing of rough concrete surfaces that remain visible for visitors

source: www.heatherwick.com/project/zeitz-mocaa/

source: www.heatherwick.com/project/zeitz-mocaa/
Demolition
Demolition
Structure after demolition
**Demolition**

Structure after demolition

![Diagram of demolition](image)

- **columns**
Demolition

Structure after demolition
Demolition

Structure after demolition

tensile forces:
needs additional steel
Repair
Repair
Face lift in new situation
Repair

Face lift in new situation - light projections

light projection source: Mothership, "Rotterdam Verlicht!"
Repair

Restoring the facade to valuable composition of heavy solid concrete blocks
Repair

Problem: exfoliation and spalling due to corrosion

the current situation is not the original situation
**Repair**

Problem: Outer layer of the concrete facade is too thin - water and air reaches the reinforcement

(source: AR1AR080_07 Technology of Conservation Presentatieslides (Van Hees & TU Delft, 2012))

(source: TU Delft University of Technology)

NB: G.B.V. Gewapend Beton Voorschriften (Dutch practitioner guidelines for reinforced concrete)

(source: AR1AR080_07 Technology of Conservation Presentatieslides (Van Hees & TU Delft, 2012))
Repair

Problem: exfoliation and spalling due to corrosion

Carbonation front

pH value drops near reinforcement causing...

Corrosion

(if H₂O and CO₂ present)

An expansive reaction leading to...

Cracking and Spalling

and further deterioration.

source: AR1AR080_07 Technology of Conservation Presentationslides (Van Hees & TU Delft, 2012)
Repair
Restoration of the concrete facade

- **current situation**
- **removing the top layer and treating the reinforcement**
- **adding a new, thicker layer of concrete (20-50 mm)**

with properties similar to the original (colors, texture, layering)
Experience
Introduction
1 The Maassilo | Future plans
2 Position and starting points | Design question
3 Design framework | Site intervention | Program | Approach | Demolition and repair | Experience | Climate | Conclusion
Introduction

1. The Maassilo | Future plans

2. Position and starting points | Design question

3. Design framework | Site intervention | Program | Approach | Demolition and repair | Experience | Climate | Conclusion
Introduction

1. The Maassilo | Future plans

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3. Design framework | Site intervention | Program | Approach | Demolition and repair | Experience | Climate | Conclusion

4th floor
Introduction

1. The Maassilo | Future plans

2. Position and starting points | Design question

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[Diagram of a building with various sections and colors, illustrating the design and features of the Maassilo.]
Music hall

Acoustics

- reverb (galm)
- clarity (heldere klank)
- envelopment (reflectie)
Music hall

Acoustics

reverb (galm)

clarity (heldere klank)

envelopment (reflectie)

affected by the size of the hall
Music hall

Acoustics

- reverb (galm)
- clarity (heldere klank)
- envelopment (reflectie)
Music hall

Acoustics

reverb (galm)
clarity (heldere klank)
envelopment (reflectie)

the sound reaches everyone in the audience
envelopment (reflectie)

clarity (heldere klank) lower frequencies

clarity (heldere klank) higher frequencies
Music hall
Section
Music hall

Moveable ceiling (Theater De Spiegel, Zwolle - GGH architecten)
**Music hall**

Details: Panels to regulate reverberation

- **Steel cable - electric winches**
  - Raise and lower the ceiling panels

- **Moveable ceiling panels, top to bottom:**
  - 18mm plywood
  - 100mm rock wool insulation
  - 18mm plywood
  - Sound absorbing foam blocks (glued)

- **Guide rails on all sides**

- **Existing concrete silo walls**

- **Existing concrete silo columns**

- **Steel strip to absorb tensile forces of silo's after demolishing**
  - Also used for attaching reflector panels

- **Steel cables for hanging ceiling reflectors**
Music hall
Details: Ceiling reflectors

- Catwalk and grid, containing power and lighting connections and pipelines
- Reflector panels
  - 18mm pine plywood (bent in the field)
  - Octagonal pattern
  - Transparant gelcoat finish
- Music hall lighting
- LED lights within triangular openings in reflector panel
clarity (heldere klank)
lower frequencies

clarity (heldere klank)
higher frequencies

envelopment (reflectie)
Music hall
Details: Balcony

- Metal balcony railing
- 18mm European larch wood
- Prefab panels
  - 18mm plywood
  - Black sound-absorbing cloth
  - European larch wood, open vertical cladding
- Ventilation grille air outlet
  - Half-hidden behind vertical cladding
Music hall
Details: Balcony

- prefab panels
  - 18mm plywood
  - black sound-absorbing cloth
  - European larch wood, open vertical cladding
- 18mm plywood floor with carpet, color anthracite
- lighting vertically directed at concrete walls
- steel sub structure
- existing concrete structure
- steel framework
- balcony framework, welded
Introduction

1 The Maassilo | Future plans

2 Position and starting points | Design question

3 Design framework | Site intervention | Program | Approach | Demolition and repair | Experience | Climate | Conclusion
**Music hall**

Details: Folding doors

- 18mm pine plywood, with transparent coating
- 40mm rock wool insulation
- Sound absorbing black cloth
- Black aluminium perforated waves panel/diffuser (BT-3D-250 Hillyland)

Existing concrete columns

Folding doors, with one separately opening door, from outside to inside the music hall:

- 18mm pine plywood, with transparent coating
- 40mm rock wool insulation
- Sound absorbing black cloth
- Black aluminium perforated waves panel/diffuser (BT-3D-250 Hillyland)

Railing for folding doors

Source: [https://binder-parametric-metal.de/](https://binder-parametric-metal.de/)
Climate concept
Climate concept
**Climate concept**

*Acoustic and thermal insulation*

Heat & cold storage

Air handling units

Rain water collection

Moveable ceiling panels in silos
**Climate concept**

Ventilation in music hall

- movable ceiling panels on rails in silos (experimental)
- air handling units with heat exchanger
- air handling units with heat exchanger
- solar energy
- reversible heating pump
- air handling units with heat exchanger
- movable ceiling panels on rails in silos (experimental) to control acoustic reverb and absorption
- rain water collection
- rain water storage
- south facade
- toilets
- heat/cold storage in silos (experimental)
Climate concept

Ventilation in music hall without seats

- Reversible heating pump
- Air handling units with heat exchanger
- Solar energy
- Movable ceiling panels on rails in silos (experimental) to control acoustic reverb and absorption
- Heat/cold storage in silos (experimental)
- South facade
- Rain water collection
- Rain water storage
- Toilets
- Closed ventilation grilles in floor
- Heat/cold storage in silos (experimental)
Climate concept

Cold demand

- Air handling units with heat exchanger
- Solar energy
- Reversible heating pump
- Air handling units with heat exchanger
- Rain water collection
- South facade
- Heat/cold storage in silos (experimental)
- Movable ceiling panels on rail in silos (experimental) to control acoustic reverb and absorption
- Rain water storage
- Toilets
- Climate concept
- Cold demand

Introduction
The Maassilo | Future plans
Position and starting points | Design question
Design framework | Site intervention | Program | Approach | Demolition and repair | Experience | Climate | Conclusion
Climate concept
Heat demand

- movable ceiling panels on rails in silos (experimental) to control acoustic reverb and absorption
- air handling units with heat exchanger
- solar energy
- reversible heating pump
- rain water collection
- air handling units with heat exchanger
- south facade
- heat/cold storage in silos (experimental)
- rain water collection
- toilets
- rain water collection
- south facade

Heat demand

- movable ceiling panels on rails in silos (experimental) to control acoustic reverb and absorption
- air handling units with heat exchanger
- solar energy
- reversible heating pump
- rain water collection
- air handling units with heat exchanger
- south facade
- heat/cold storage in silos (experimental)
- rain water collection
- toilets
- rain water collection
- south facade
Conclusion
Music hall
Fragment of the music hall
Parts to be built
Parts to be built

acoustic music hall
Parts to be built

acoustic music hall    central hall and exposition space
Parts to be built

- acoustic music hall
- central hall and exposition space
- restaurant, offices and music recording studios
Program
Makers & collaborators zone
Program
Visitors & art zone

visitors & art zone

makers & collaborators zone
Program
Visitors & music zone

Visitors & art zone

Makers & collaborators zone
Program
Vertical traffic zones
Floor plans
Basement floor

1. cloakroom and toilets
2. backstage area
3. dressing rooms
4. passageway
Floor plans

Ground floor:

1. music hall
2. practice space
3. foyer
4. central hall
5. shops
6. info and tickets
7. coffee corner
8. makerssquare
9. practice/workshop studios
10. art studios
Floor plans

2nd floor

1. music hall balconies
2. exposition space
3. music recording studios
4. office space
Floor plans
3rd floor

1. music hall balconies
2. artists lounge, green rooms
3. exposition space
4. office space
Floor plans

4th floor

1. music hall catwalk
2. artists lounge, green rooms
3. exposition space
4. office space
Floor plans
5th floor

1. exposition space
2. office space
Floor plans
7th floor

1. sculpture garden
2. restaurant and roof terrace
3. kitchen space
**Floor plans**

10th floor

1. club, theater, event space
2. foyer, stage, event space
3. backstage area
4. toilets
5. technical space and storage
6. flexible space, events
Interior
Central hall and exposition space
**Interior**

Central hall and exposition space
Facade
Face lift in new situation
Music hall
2nd floor
Music hall
3rd floor
Music hall
4th floor
Music hall
Details: Panels to regulate reverberation
Music hall
Details: Panels to regulate reverberation
Music hall
Details: Panels to regulate reverberation
Music hall
Details: Panels to regulate reverberation
Program concept
Program concept
Large scale spaces
Program concept
Smaller scale spaces
Program concept
Spaces needed for interconnecting the building, the context and the cultural program

INTERCONNECTIVITY BETWEEN CITY, MAASSILO AND MAASHAVEN

INTERCONNECTIVITY BETWEEN SPACES

LARGE SPACES

SMALLER SPACES

Tourbus parking
Partyboat quay
Cargo loading / unloading
Maashaven harbour area
Storage & technical space
Vertical transport
Reception & tickets
Main foyer
Lockers
Entrance
Rotterdam Tourist Info
Shop
WC
Bicycle parking
Metro station
Nearby parking
The Maassilo

The harbour has moved to the west of the city - 2000
The Maassilo

The harbour has moved to the west of the city - 2000
Main sources
See reflection paper for an expanded list of used sources.