converting office space
using modular prefab architecture to convert vacant office buildings

MSc graduation presentation | F.P. Koornneef

date + Friday 13th of April
time + 15.45
location + Lecture hall B
Faculty of Architecture - Julianalaan 134, Delft
overview

+ introduction
+ research findings
+ concept development
+ design project
+ summary

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Faculty of Architecture - Julianalaan 134, Delft
48.195.000 m² total office space
6.795.000 m² vacant
48.195.000 m² total office space
no more future demand for \(1\) out of \(10\) buildings

\[6.795.000\ m^2\ \text{vacant}\]

\[48.195.000\ m^2\ \text{total office space}\]
negative effects on direct environment

property depreciation

waste of usable space
further exploitation?
renovation?
demolishment?
conversion?
research findings
by means of design, what can the architect contribute to make conversion projects more feasible on a large scale?

- **design research**
  - office architecture
  - building characteristics
  - typology of office vacancy

- **conversion potential**
  - difficulties
  - opportunities
design research

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office façades

- façade physically outdated
- unattractive for converted function
- closed curtain-wall system

construction as obstruction

- load-bearing beams: lower ceilings
- steel reinforcement restricts floor openings
- not sufficient sound insulation

conversion costs

- façade and inner walls
- not sufficient knowledge
- high risks / unexpected costs

conversion potential + difficulties
standard office dimensions

> rectangular shaped building
> grid size: 5.4 or 7.2 meters (basis 1.8 m)

basic building structure

> over-dimensioned (300-500 kg/m2)
> open floor plan + vertical transport

conversion potential

+ opportunities
the architect could contribute if he would use the standardization in office design to devise smart systems, realizing the difficulties, but working with the opportunities the office building offers.
office structure as a support for prefab
concept development
vacant office building  
prepare as support  
deploy prefab units

conversion concept
vacant office building

prepare as support

deploy prefab units

time efficient

cost efficient

conversion concept

standard sizes
concept development

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additional research
13 out of 200 buildings

grid - 5.4 meter

4700

20 out of 200 buildings

plan

total 16.5 %

grid - 7.2 meter

6500

cross section

2900

2800
designing within margins

+3600

+2800

P = 0
A  generate extra floor space

> cost effective (€ / m² office > € / m² housing)
> add balconies & outdoor spaces
> optimize views on surroundings

B  minimize work on building

> leave building structure intact (as much as possible)

C  mixed-use programming

> work/living concept
> flexible unit design

D  sustainability

reuse / recycle
building structure
material preservation

requirements
**design considerations**

A. positioning wet cells

outside of building

inside of building

B. positioning shafts

drill new holes

use existing shafts

bring shaft to outside
new façade

- problematic gaps
- closed units
- closed unit + add façade elements
- open unit + façade element

linking units

- vertical connection possible
- link units outside building
- no vertical connection
- link units inside building
E transportation

- truck | transport entire prefab unit
- truck | transport prefab elements of unit
- barge | transport entire prefab unit / elements

F deployment on site

- assembly in building
- assembly in one piece on building site
- assembly in ‘slices’ on building site
technical considerations

A. canterlevering units without large interventions
- large moment of force
- shear forces (wind)
- stabilize by integrated frame
- load-bearing frame along façade
- self-bearing construction (in balance)

B. securing to the building
- rest on existing (hanging) office floor
- no ability to adjust (for leveling)
- guiding rail - close to columns
- ability to adjust (for leveling)

C. cold / warm construction
- warm building structure, insulation line outside
- cold building structure, insulation line inside
conversion concept

strip office façade
materials can be recycled
prepare building structure
place (leveled) rails
adjust for leveling prefab units
slide in prefab unit (in segments)
over steel rails with teflon (97% friction reduction)
slide in prefab unit (in segments)
over steel rails with teflon (97% friction reduction)
connect installations to shaft
no adjustments to the existing structure needed
place façade-segment
new insulation line, shaft is closed off
place façade-segment
new insulation line, shaft is closed off
linking possibilities
design project
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- wijnhavenkwartier
- apartment buildings
- high vacancy levels
wijnhavenkwartier
no connection with maasboulevard

wijnhavenkwartier
year: 1968
energy label: G
10,000 m² vvo
inactive plinth
addition two floors  
installation floor  
no open façade  
limited parking (50 pp)
two cores
open floor plan
7.2 x 7.2 m grid
height clearance 2800 mm
replacement façade

123 m² per floor extra
(= 12% extra in total)
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- Principles:
  - Adding new floor
  - Floor height 4.6 m
  - Conversion according to concept
  - Open up plinth
  - Activate backside
adding floor space
Converting office space

- Conversion according to concept
- Adding amenities in lower spaces
- New addition: large apartments
- Roof garden
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façade design

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7th & 8th floor | +23450 | +30150

roofplan | +33950
summary