Open Modular Facade Concept

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content presentation

- introduction
- theory
  - modularity
  - facades
- design
  - design process
  - variants
  - final design
- conclusions
metal-glass facade

common layout of metal-glass facade
metal-glass facade
metal-glass facade

- metal-glass facade reaches maturity
- time for a new product
new façade developments

polyvalent wall of mike davies

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new developments

schüco e² fassade
new developments

schüco e² fassade
wicona te-motion
open modular facade concept

new developments

schüco e² fassade
wicona te-motion
schossig & gatermann capricorn building
new developments

schüco e² fassade
wicona te-motion
schossig & gatermann capricorn building
cepezed smart box energy facade
new product idea: open modular façade
new product idea: *open modular façade*

assignment:

design a facade system as an alternative for the metal-glass facade

by re-thinking its modular set-up
new product idea: **open modular façade**

assignment:

*design a facade system as an alternative for the metal-glass facade*

by re-thinking its modular set-up

requirements:
new product idea: *open modular façade*

assignment:

*design a facade system as an alternative for the metal-glass facade*
by re-thinking its modular set-up

requirements:

- integration of functions
new product idea: *open modular façade*

assignment:
*design a facade system as an alternative for the metal-glass facade*
by re-thinking its modular set-up

requirements:
- integration of functions
- upgradeability and flexibility
new product idea: *open modular façade*

**assignment:**

*design a facade system as an alternative for the metal-glass facade*

by re-thinking its modular set-up

**requirements:**

- integration of functions
- upgradeability and flexibility
- without losing geometrical possibilities
modularity advantages
modularity advantages

- reduction in product development time
modularity advantages

- reduction in product development time
- product variety
modularity advantages

- reduction in product development time
- product variety
- customization and upgrades
modularity advantages

- reduction in product development time
- product variety
- customization and upgrades
- quality
modularity advantages

- reduction in product development time
- product variety
- customization and upgrades
- quality
- design standardization
modularity advantages

- reduction in product development time
- product variety
- customization and upgrades
- quality
- design standardization
- reduction in order lead time
product architecture

basically two different types of product architecture
product architecture

basically two different types of product architecture

- integral architecture
product architecture

basically two different types of product architecture

- integral architecture

- modular architecture
program of demands
program of demands

- **primary grounds** for the modular façade concept
  - upgradeability
  - flexibility
  - integration of functions
program of demands

- primary grounds for the modular façade concept
  - upgradeability
  - flexibility
  - integration of functions
- rules and conditions of modularity
program of demands

- primary grounds for the modular façade concept
  - upgradeability
  - flexibility
  - integration of functions
- rules and conditions of modularity
- office building facade
open modular facade concept

introduction  theory  design  conclusions

design process

from product development
design process
open modular facade concept

introduction  theory  design  conclusions

Modular facade concept

first idea

brainstorm

design process

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design process

open modular facade concept | introduction | theory | design | conclusions

Modular facade concept

first idea

brainstorm

starting points

Final Design

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open modular facade concept

introduction

theory

design

conclusions

first idea

brainstorm

starting points

first sketches

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open modular facade concept

design process

first idea

brainstorm

starting points

first sketches

design ideas

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design process
design process

open modular facade concept

first idea
brainstorm
starting points
first sketches
design ideas
evaluate

Modular facade concept

Final Design

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design process

open modular facade concept

introduction          theory          design          conclusions

Modular facade concept

- first idea
- brainstorm
- starting points
  - first sketches
  - design ideas
  - evaluate
  - four concepts

Final Design

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design ideas

- design cladding
- lego modules
- smart component
- smart post
design ideas

- design cladding
- lego modules
- smart component
- smart post
design ideas

- design cladding
- lego modules
- smart component
- smart post
design ideas

- design cladding
- lego modules
- smart component
- smart post
design process

open modular facade concept

first idea
brainstorm
starting points
first sketches
design ideas
evaluate
four concepts
evaluate
final design

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smart post
open modular facade concept

introduction

theory

design

conclusions

smart post

- modules inside post
smart post

- modules inside post
- input (media) inside post
basic principle
basic principle
basic principle
basic principle
basic principle
open modular facade concept

introduction

theory

design

conclusions

basic principle
## Basic Principle

<table>
<thead>
<tr>
<th>Open Modular Facade Concept</th>
<th>Introduction</th>
<th>Theory</th>
<th>Design</th>
<th>Conclusions</th>
</tr>
</thead>
</table>

**Image Description:**
- **Air Exhaust:**
- **User Interface:**
- **Fresh Air:**
- **Electricity Users:**

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basic principle

modularity in three ways
basic principle

modularity in three ways
- inside posts
basic principle

modularity in three ways
- inside posts
- panels
basic principle

modularity in three ways
- inside posts
- panels
- sun shading
possible integrated functions

inner climate

- heating / cooling
- ventilation
- heat recovery
possible integrated functions

optional
<table>
<thead>
<tr>
<th>open modular facade concept</th>
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<th>design</th>
<th>conclusions</th>
</tr>
</thead>
</table>

possible integrated functions

optional

- artificial lighting
possible integrated functions

optional

- artificial lighting
- sun shading
possible integrated functions

optional

- artificial lighting
- sun shading
- building management system
possible integrated functions

optional

- artificial lighting
- sun shading
- building management system
- electricity and internet
**open modular facade concept** | introduction | theory | design | conclusions

possible integrated functions

other possibilities

- pv cells
<table>
<thead>
<tr>
<th>open modular facade concept</th>
<th>introduction</th>
<th>theory</th>
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<th>conclusions</th>
</tr>
</thead>
</table>

**possible integrated functions**

**other possibilities**

- pv cells
- solar collector
possible integrated functions

other possibilities

- pv cells
- solar collector
- electro chromic glass
possible integrated functions

other possibilities

- pv cells
- solar collector
- electro chromic glass
- sprinkler
possible integrated functions

other possibilities

- pv cells
- solar collector
- electrochromic glass
- sprinkler
- storage
possible integrated functions

other possibilities

- pv cells
- solar collector
- electro chromic glass
- sprinkler
- storage
- media (like unica tower in vienna)
possible integrated functions

other possibilities

- pv cells
- solar collector
- electro chromic glass
- sprinkler
- storage
- media (like uniqua tower in vienna)
- ...
key elements
key elements

1 backbone
key elements

1 backbone
2 media
key elements

1 backbone
2 media
3 transfer element
key elements

1 backbone
2 media
3 transfer element
4 sun shading
product

1 backbone
2 media
3 transfer element
4 sun shading
5 modular fixing
Product

1 backbone
2 media
3 transfer element
4 sun shading
5 modular fixing
6 user interface
façade construction
façade construction
façade construction
façade construction
interior design
interior design
interior design
interior design
exterior design
advantages
advantages

- integration of different components
advantages

- integration of different components
- interior free of installations
advantages

- integration of different components
- interior free of installations
- engineering and testing has been done
advantages

- integration of different components
- interior free of installations
- engineering and testing has been done
- transparency and accessibility of installations
advantages

- integration of different components
- interior free of installations
- engineering and testing has been done
- transparency and accessibility of installations
- “fool proof”
disadvantages
disadvantages

- size of the posts
disadvantages

- size of the posts
- media running on the outside
disadvantages

- size of the posts
- media running on the outside
- expensive
opportunity
opportunity

-a ready-made system
opportunity

- a ready-made system
- relatively free to design
ready made system

- catalogue product
ready made system

- catalogue product
  - modular units
ready made system

- catalogue product
  - modular units
  - colour / material
ready made system

- catalogue product
  - modular units
  - colour / material
ready made system

- catalogue product
  - modular units
  - colour / material
ready made system

- catalogue product
  - modular units
  - colour / material
  - form
ready made system

- catalogue product
  - modular units
  - colour / material
  - form
ready made system

- catalogue product
  - modular units
  - colour / material
  - form
ready made system

- catalogue product
  - modular units
  - colour / material
  - form
  - grid
ready made system

- catalogue product
  - modular units
  - colour / material
  - form
  - grid
ready made system

- catalogue product
  - modular units
  - colour / material
  - form
  - grid

- market
  - refurbishment
  - medium size office buildings
relatively free to design
relatively free to design

- interfaces pre-designed
relatively free to design

- interfaces pre-designed
  - modular units
  - colour / material
  - form
  - grid
relatively free to design

- interfaces pre-designed
  - modular units
  - colour / material
  - form
  - grid
  - sizes
relatively free to design

- interfaces pre-designed
  - modular units
  - colour / material
  - form
  - grid
  - sizes
  - horizontal/vertical
relatively free to design

- interfaces pre-designed
  - modular units
  - colour / material
  - form
  - grid
  - sizes
  - horizontal/vertical
  - load bearing
relatively free to design

- interfaces pre-designed
  - modular units
  - colour / material
  - form
  - grid
  - sizes
  - horizontal/vertical
  - load bearing

- market
  - large projects
  - architects
Open Modular Facade Concept
Open Modular Facade Concept
evaluation step

using a **cardinal selection** method

<table>
<thead>
<tr>
<th></th>
<th>flexibility</th>
<th>geometrical possibilities</th>
<th>originality</th>
<th>feasibility</th>
<th>score</th>
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<tbody>
<tr>
<td>factor</td>
<td>2</td>
<td>1</td>
<td>3</td>
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<td>design cladding</td>
<td>7 (14)</td>
<td>9 (9)</td>
<td>8 (24)</td>
<td>4 (12)</td>
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<tr>
<td>lego modules</td>
<td>8 (16)</td>
<td>6 (6)</td>
<td>8 (24)</td>
<td>7 (21)</td>
<td>67</td>
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<tr>
<td>smart component</td>
<td>6 (12)</td>
<td>8 (8)</td>
<td>6 (18)</td>
<td>8 (24)</td>
<td>62</td>
</tr>
<tr>
<td>smart post</td>
<td>7 (14)</td>
<td>8 (8)</td>
<td>8 (24)</td>
<td>8 (24)</td>
<td>70</td>
</tr>
</tbody>
</table>
modularity

*modularity* (in design) refers to the development of a *complex product* (or process) from smaller *subsystems* that can be designed *independently*

karl ulrich
modular product architectures

- bus
- slot
- sectional
### Morphological Map

#### Parameters

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Components</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sun shading</td>
<td><img src="image1" alt="Sun shading Components" /></td>
</tr>
<tr>
<td>Storage interior</td>
<td><img src="image2" alt="Storage interior Components" /></td>
</tr>
<tr>
<td>Artificial lighting</td>
<td><img src="image3" alt="Artificial lighting Components" /></td>
</tr>
</tbody>
</table>

#### Divergent Step

- **Inside post when there is no module**
- **Shelves connected to narrowing post**
- **Shelves in between the posts**
- **Shelves on the sides of the posts**
- **Drawer inside post**

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**03 04 2008**
A diagram illustrating the facade functions and function tree for architectural design.
curtain wall

- curtain wall systems reach maturity
- time for a new product