A Modular Construction System. How to design its production process?

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A Modular Construction System

- What is it?
- Why clients ask for Modular buildings?
- How to design the production process?
Modular Construction System

Some elements and relations:

- Modular buildings
- Modules
- Modular parts
- Modular connections
- Modular assembling and transportation
- Modular builders
Modular Building

Not self supporting modules
Modular Building

Not self supporting modules
Modular Building

Not self supporting modules

Medical research centre
Amsterdam, 2006
Modular Building

Not self supporting modules
Modular Building

Self supporting modules
Modular Building

Modular parts
Specials

Built-in sanitary modules
Specials
Modulbox.de

Micro Compact House
Specials
Specials

Staircase
Modular Construction System production scheme

- Assembly in factory
- Transport
- On-site installation
- Prefabricated parts
- Modular parts
- Dry connection
Assembly in factory
Plant modular builder
Transportation
On-site installation
Modular connection
Why Modular Construction Systems?

Clients ask for:

- A short delivery lead time
- A particular location
- Special financing
- A limited duration of use
- One contact

These are arguments to opt for an adaptable building based on a modular construction system.
Modular builder

To design a modular building construction system is complex:

- There is no personal client, but a largely poorly defined market.
- The establishment of a production plan involves a substantial number of assumptions.
- The term for the amortization of mechanizing or robotizing investments is unknown.
- The client and society want a safe, sustainable and attractive building, not a semi-permanent solution.
How to design?

Design aspects:
- Marketing research
- Product development
- Production
- Sales

Design feedback tools for a production system:
- An object tree
- A guideline
- A ranking system
Object Tree

Assembly on site

Assembly factory

Purchase

Order list

Option A

Option B

IFD-House

Single material
Guideline

Step 1
Production typology

Step 2
Production strategy

Step 3
Client choice

Step 4
Production systems
Ranking system

Criteria

• Construction time on site
• Costs
• Labour on site
• Transport (damage)
• Transport (size)
• Freedom of choice

Coloured filters

Red: negative influence, re-shuffle boxes
Yellow: neutral, re-shuffling not necessary
Green: positive influence, move boxes here
Result: production system

Flow: all products
same production
sequence

Shop: product stays
more time in one
section,
Summary

- The guideline is a decision model that serves as a feedback to market research, product development and sale.

- Designing a modular system (including the production process) is a collaborating design process.

- Knowledge of the market is important.
Result: production system

- Storage pre-assembled products (windows and doors)
- Steelframe elements
- Protective sheets
- Interior wall panels
- Insulation material

- Garbage bin
- Completed façade elements, ready for transport and assembly
- Overhead traveling crane

- Mould A
- Mould B

- Rolling door
- Truck delivery access way (inside factory)

Dimensions:
- 20.0 m x 26.0 m