



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

Frans van Gassel & Martin Roders

Outline

A Modular Construction System

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

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



Medical research centre

Amsterdam, 2006

Not self supporting modules

Modular Building



Not self supporting modules

Modular Building



Self supporting modules

Modular Building



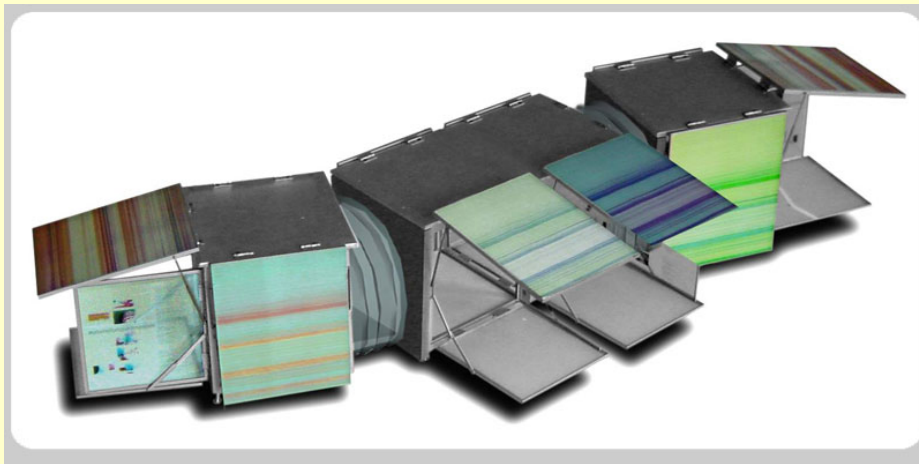
Modular parts

Specials

Built-in sanitary modules



Specials Modulbox.de



Micro Compact House

Specials



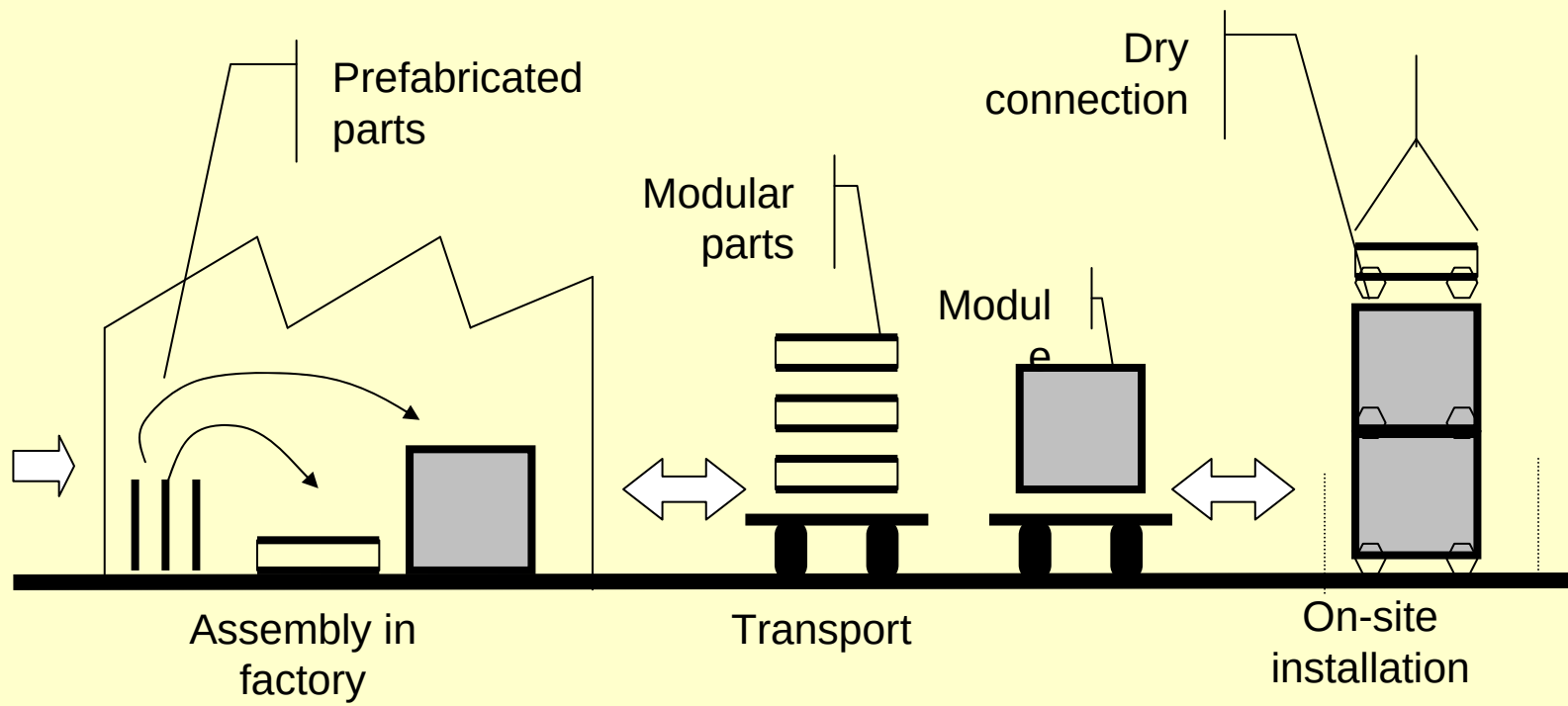
?

Specials



Staircase

Modular Construction System production scheme



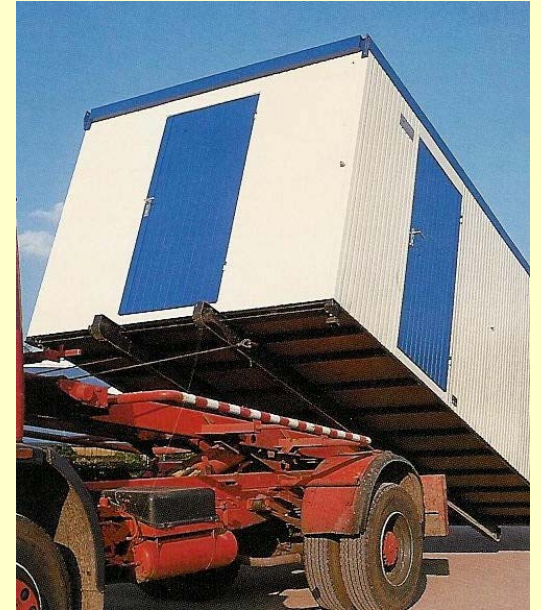
Assembly in factory



Plant modular builder



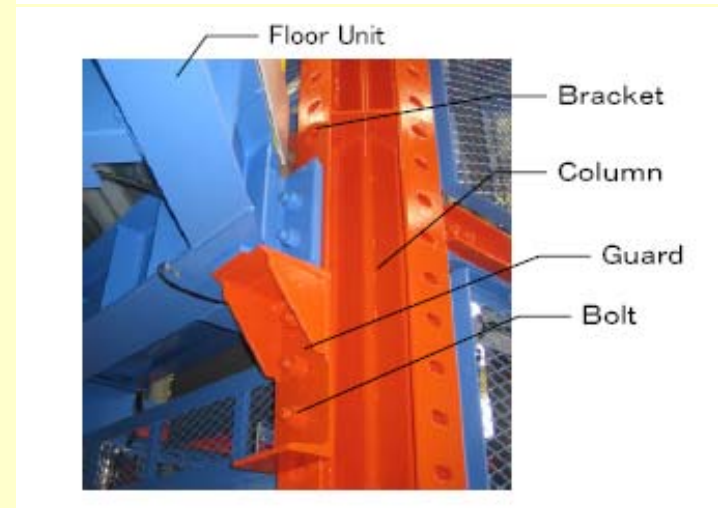
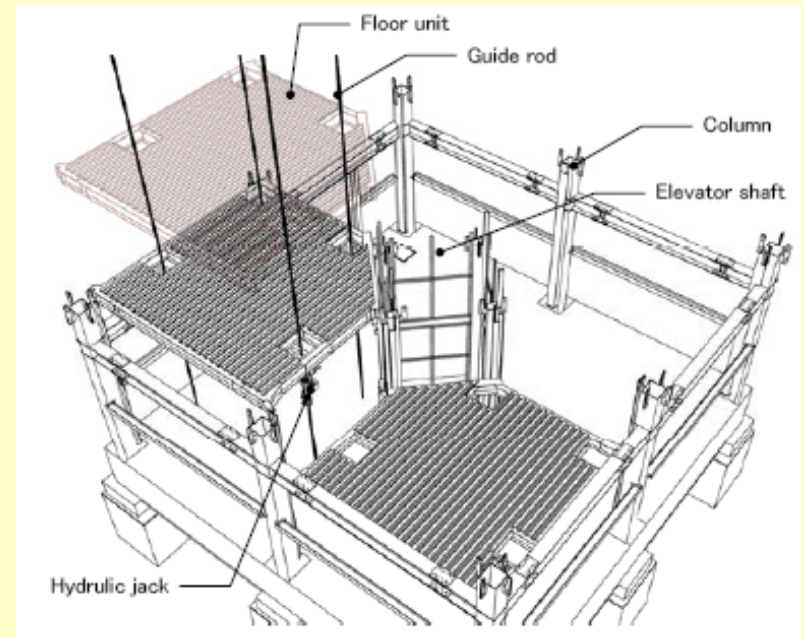
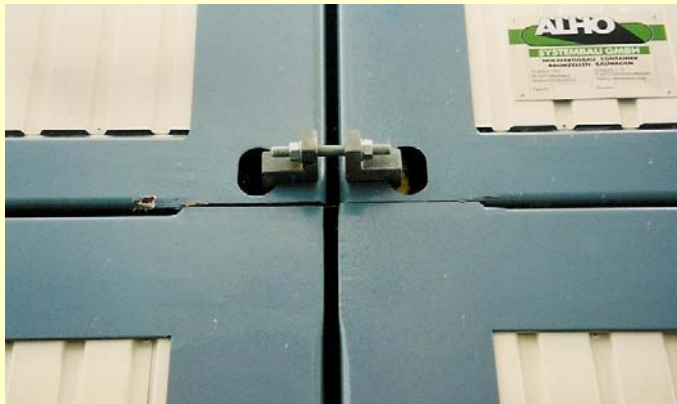
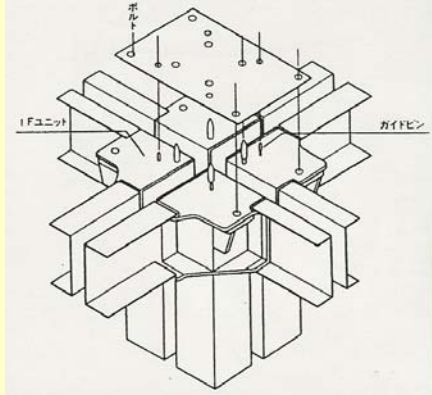
Transportation



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

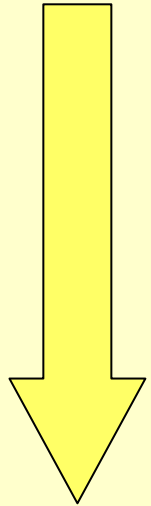
These are arguments to opt for an adaptable building based on a modular construction system.

Modular builder

To design a modular building construction system is complex:

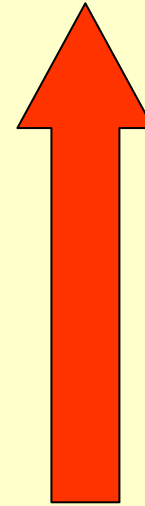
- There is no personal client, but a largely poorly defined market.
- The establishment of a production plan involves a substantial number of assumptions
- The term for the amortization of mechanizing or robotizing investments is unknown
- The client and society want a safe, sustainable and attractive 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



[IFD-Buildings]

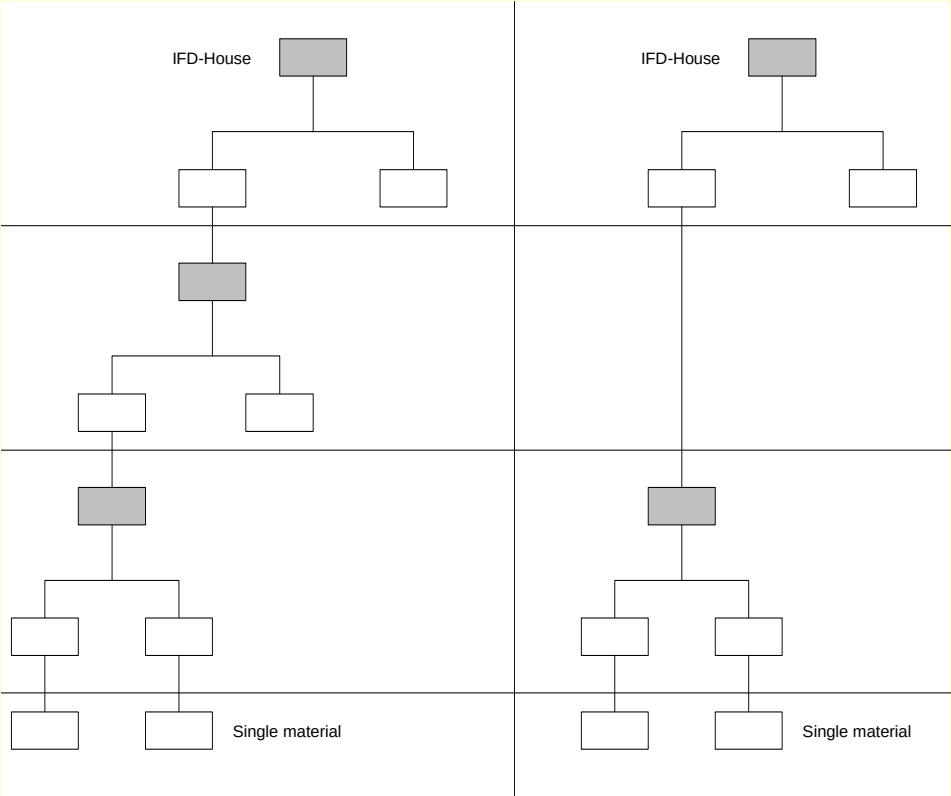
Object Tree

Assembly
on site

Assembly
factory

Purchase

Order list

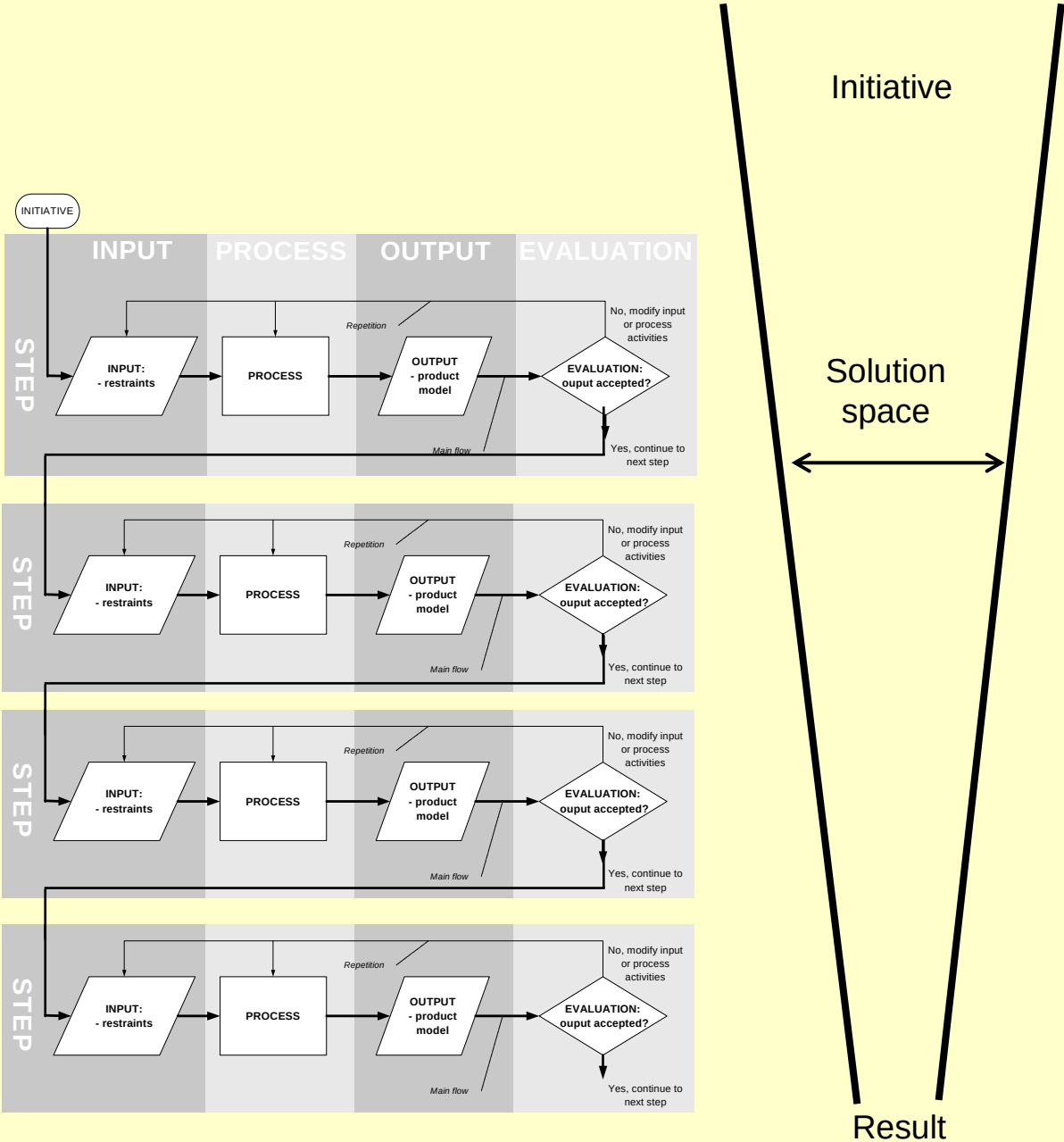


Option A

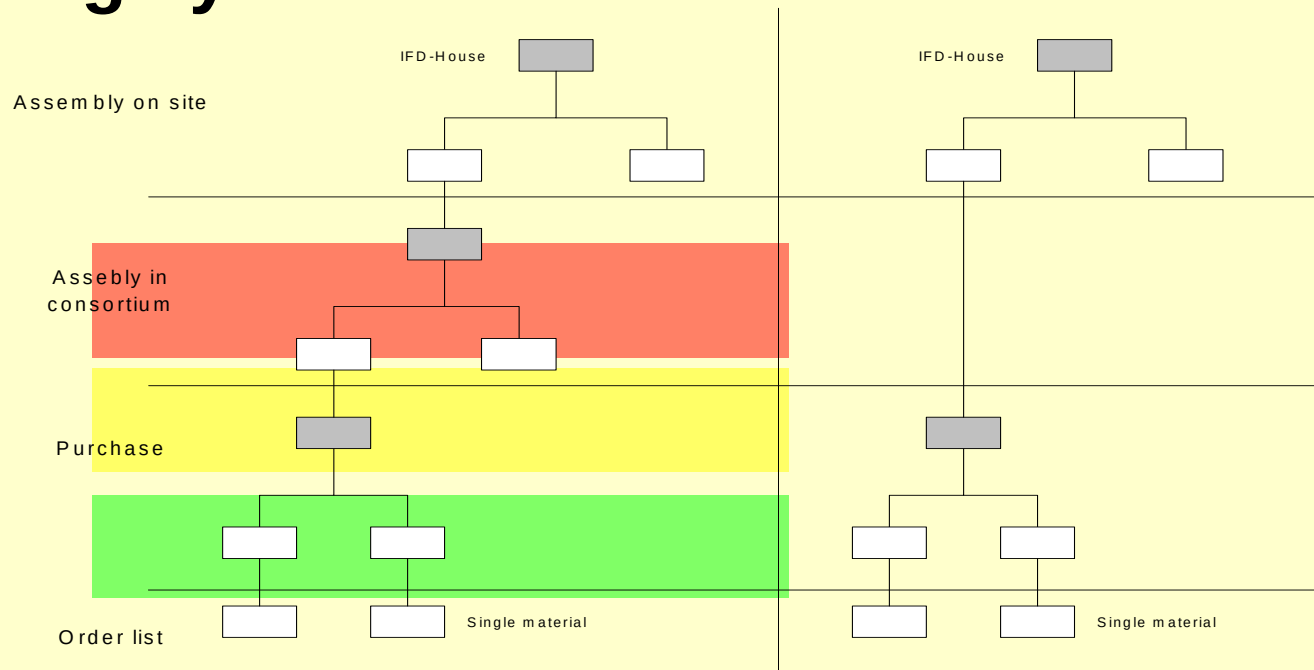
Option B

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

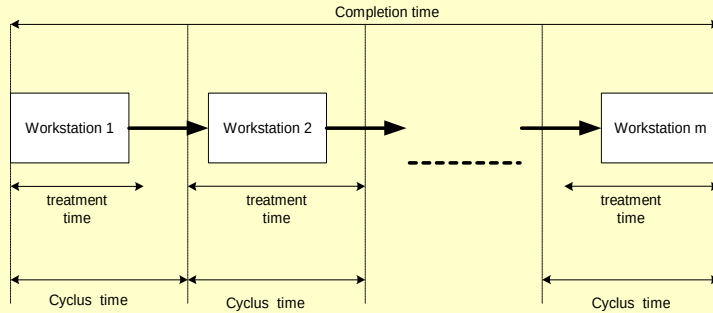
Coloured filters

Red: negative influence, re-shuffle boxes

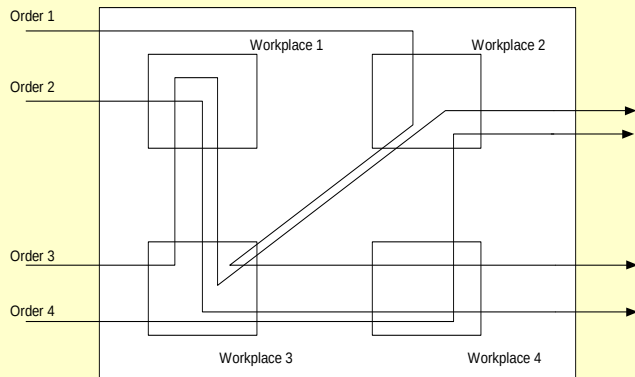
Yellow: neutral, re-shuffling not necessary

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

