TEMPO

BMBF Research project “Biodiversity and Temporary Building”

Building references catalogue

February 2007

REFERENCE CATALOGUE: TEMPORARY BUILDINGS

Title of the project
TEMPO - Temporal building

Authors list
Finn Geipel, Susan Draeger, Henrike Rabe, Heiko Walth, Anna Wozniak

Address
LIA – Laboratory for Integrative Architecture, University of Technology Berlin, Unit of Prof. Finn Geipel, Secr. A20, Strasse des 17.Juni 152, D-10623 Berlin, Germany, susan.draeger@tu-berlin.de

Contact person
Prof. Dr. Michael Kleyer, michael.kleyer@uni-oldenburg.de, www.uni-oldenburg.de/landeco/

Supported by the BioTeam program of the German Federal Ministry of Education and Research, project ID: 01LM0210; duration: 2003 - 2007, project leader: Prof. Dr. Michael Kleyer, contact: michael.kleyer@uni-oldenburg.de, www.uni-oldenburg.de/landeco/Projects/tempo/index.htm

Introduction

This reference catalogue presents a selection of build temporary buildings, applied as main references for the research project “Tempo – Temporary Building” carried out at University of Technology Berlin conducted by Prof. Finn Geipel.

Important aspects for the inspection of temporary buildings are the time frame, the scale and the program. Theses aspects are show together with the different categories (low budget, modular, rapid assembly, recycling, reusable, small impact on the landscape) in form of diagrams on each reference page.

The Reference catalogue shows a selection of the investigated projects. This list is not exhaustive.

The projects were selected regarding criteria of high reusability, recycling, mobility, modularity, low budget and minimal effects on the soil with regard to surface sealing or lasting changes. Each of the shown reference projects has specific qualities in one or more of these criteria.

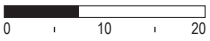
All reference projects have been built after 1980 with the exception of some projects built between the 20s and 70s. The reason for this selection is the structural transformation of the economy and the society that started over 20 years ago.

The goal of the reference research is to define conditions for and the definition of suitable, temporary building typologies.

Finn Geipel, Susan Draeger, TU Berlin, 28.02.2007

Legend

Time Frame:



(> 20 = permanent)
(years)

Scale:

1000	Urban planning
200	Building
50	Object

Program:

A	Art
E	Exhibition
H	Housing
I	Industrial building
P	Public building
O	Object

Criteria:


Low budget


Modular


Rapid assembly


Recycling


Reusable


Small impact on the landscape

Building Character:


Foldable System


Integrative model


Mobile


Modular (2-dimensional)


Modular (3-dimensional)


Bricolage Model

Construction System:


Container


Pneu


Solid construction


Steel framework


Tent


Wood framework


Combined construction

Content

	Piano, Rogers	B & B Italia Office Building	Novedrate, Italy	1973
	Prouve, Jean	Tropical House	Africa	1949
	Yamamoto, Riken	Ora Town Hall	Ora, Japan	2003-
50	Ban, Shigeru	Paper Structure	Puilly-en-Auxois, France	2002
	Barthel & Maus	Modular load-bearing construction	Europe	2001

3 Autorenarchitektur

200	Aisslinger	Loftcube	Berlin, Germany	2003
	aml Architekturwerkstatt	Temporary bank	Nuremberg, Germany	2000
	Attila Foundation	paraSITE	NL	1996
	Ban, Shigeru	Japanese Expo pavilion	Hanover, Germany	2000
	Ban, Shigeru	Paper Log House	Kobe, Japan	1995
	Ban, Shigeru	Nomadic Museum	New York, USA	2005
	Bergquist, Larsson, Nordström	Jukkarsjärvi Ice Hotel	Jukkarsjärvi, Sweden	1997
	Böhtlingk, Eduard	Extendible caravan with tent roofs	Europe	1998
	Circus Architects	Mobile cinema (Project)	Scotland, U.K.	1996
	Exilhäuser	Multifunctional extra room	Pfaffing, Germany	2001
	Festo Corporate Design	Airtecture	Esslingen, Germany	1996
	Festo Corporate Design, A.Thallemer	Airquarium	Esslingen, Germany	2002
	FLT Happold	Mobile Campus	New York City, USA	1998
	Future Systems	MoMi	London, UK	1991
	Jullien, Béatrice	Exhibition pavilion	Vallery, France	1996
	Kalhöfer & Korschildgen	Movable Studio	Remscheid, Germany	1997
	Kaufmann & Norlander	A&B house	Europe	2002
	Lacaton & Vassal	Latapie house	Floirac, Bordeaux, France	1993
	Piano, Renzo	IBM travelling pavilion	Europe	1982
	Pugh & Siegal	Office for mobile design	Venice, USA	1998
	Rigamonti, Jorge	Campamento turistico Cayo Crasqui	Los Roques, Venezuela	1991
	Schneider & Schumacher	Info Box	Berlin, Germany	1995
	Studio Andreas Heller	Exhibition pavilion	Germany	1998

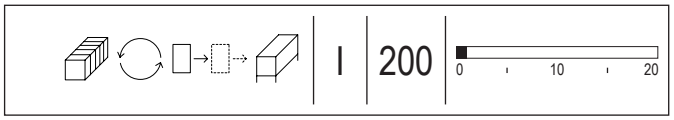
	Turkali, Zvonko	Kulturmobil	Frankfurt a. M., Germany	1996
	Zumthor, Peter	Swiss Expo pavilion	Hanover, Germany	2000
50	Hoberman, Chuck	Geodesic dome	UK	1996
	Ito, Toyo	Dwelling for Nomad Women - Pao	Tokyo, Japan	1985
	Kalhöfer & Korschildgen	Mobile kitchen	Germany	1998
	Nakao, Hiroshi	Black Maria	Karuizawa, Japan	2000
	Ruiz de Azúa, Martin	Elementary house	Germany	2000

4 Objekte mit partiellem Bezug

200	Alfred-Wegener-Institute	Neumayer Research Station II	Antarctica	1992
	British Antarctic Survey	Halley Research Station V	Antarctica	1991
	Fave, Jean-Paul	Concordia (Dome C)	Antarctica	2004
	Maersk	Oil Platform Maersk Guadrian	North Sea	1982
	Rosaviakosmos	MIR Space shuttle	Universe	1986
	Saipem	Offshore Construction	worldwide	1987
	BMW Group	MobiCell	Germany	2004
	Schott Zwiesel	MobiFak-Modul	Europe, Asia	2004
50	WoodMizer	Portable Sawmill	Europe, USA	1995

Datasheets

1 Industriell gefertigte serielle Bauten



Category
Low Budget
Modular
Recycling, Reusable
Small impact on landscape

Project
Temporary Television Center at Roland Garros Tennis Championship

Author
Algeco Container System

Short description
Television center for the Roland-Garros Tennis Championship. 150 modules of prefabricated container boxes, 3-level-stacking.
The container are insulated office container, which are available in different sizes and for rent or for sale. The office containers used for the television center have standard size (6 x 2,5 x 2,8m). The television Center was assembled in three weeks before the championship and dismantled afterwards.

Site
Paris, France

Year
2003

Program
Temporary Television center

m²
2200

(Office container 15m²)

Cost
461 € / m²

(total costs for Office container: 5000 €)

useful life, intended
Single use: < 1 year
Total lifespan: > 20 years

Recyclability
Boxes 100% recyclable
Product recycling
Container Reusable

Construction
Container Boxes
(three level stacking)

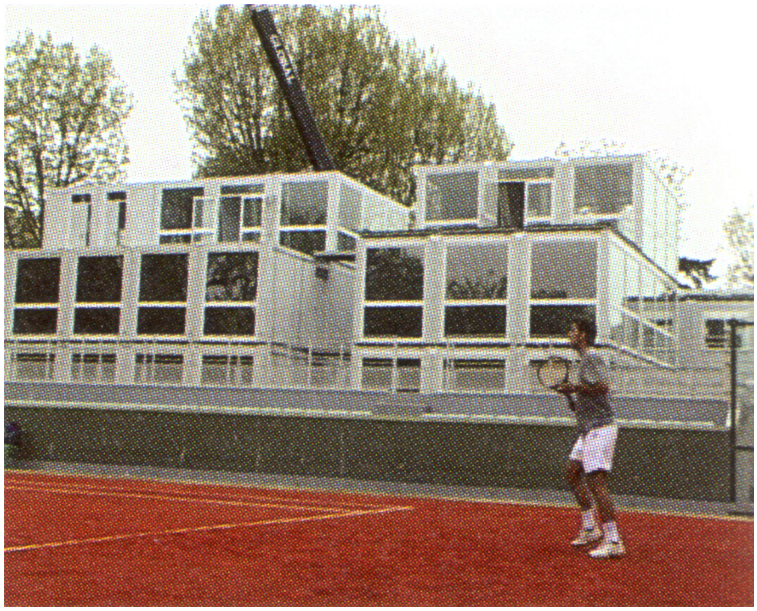
Material
steel panel
insulation: 41 mm polyurethane foam

Installation
plugged in from outside

Foundation
No foundation necessary
if put on hard underground
(Asphalt surface)

Building character

Source / Photograph Credits
- L'architecture d'aujourd'hui 348, 09/10 2003, p. 24 ff



*View

*View

E | 200 | 0 10 20

Category
Low budget
Modular
Rapid Assembly, Reusable
Small impact on landscape

Project
XX-Box System / Type 001

Author
Atelier Hitoshi Abe

Short description
The XX-Box System is a temporary space construction that can be set up and dismanteld at any time. It offers a temporary exhibition space that anyone can design and build, based on the principle just like Lego. For materials, it uses the forms for pouring concrete and the scaffolding and drop-sheets that have tended to play only a supporting role in architectural activity to date. The system is built entirely from a combination of construction site materials available on the market.

Site
Shiroishi, Miyaki Pref., Japan

Year
1995

Program
exhibition space

m²
35

Cost

useful life, intended
Single use: < 1 week
Total lifespan: permanent

Recyclability
reusable

Construction
Scaffolding

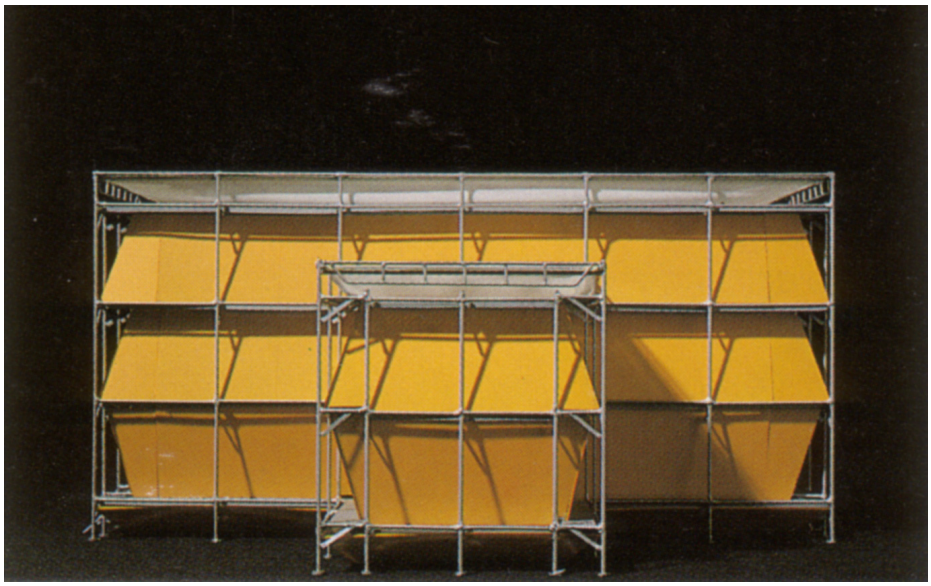
Material
scaffolding
drop-sheets
panels

Installation
-

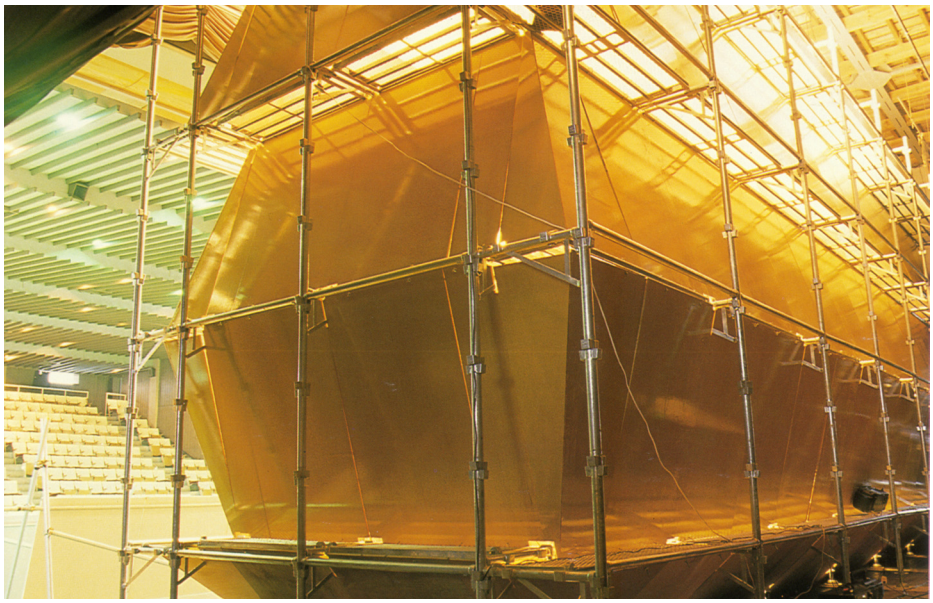
Foundation
No foundation necessary

Building character

Source / Photograph Credits
- JA no.3, 1995



*Model



*View

E | 200 | 0 10 20

Category
Low budget
Modular
Rapid assembly, Reusable
Small impact on landscape

Project
Container Structure
Nova Oshima Showroom

Author
Shigeru Ban

Short description
The temporary furniture showroom was built to last for just one month but was designed to provide a mobile exhibition afterwards. Small rental containers were intended for use as stores for roadwork machinery, and equipped with a shutter as a show window for the furniture. The primary structure is provided by the container itself, while the space is enclosed by a light steel frame and a tent like ceiling. Only the frame and tent need to be stored and transported, while the main structural container itself can be hired at any rental company branch.

Site
Tokyo, Japan

Year
1994

Program
Exhibition space
Temporary furniture showroom

m²
289

Cost
470 € / m²

useful life, intended
Single use: 1 month
Total life span: > 20 years

Recyclability
Reusable

Construction
aluminium container (rental)
light steel frame (roof)

Material
container: aluminium
structure frame: steel
membrane

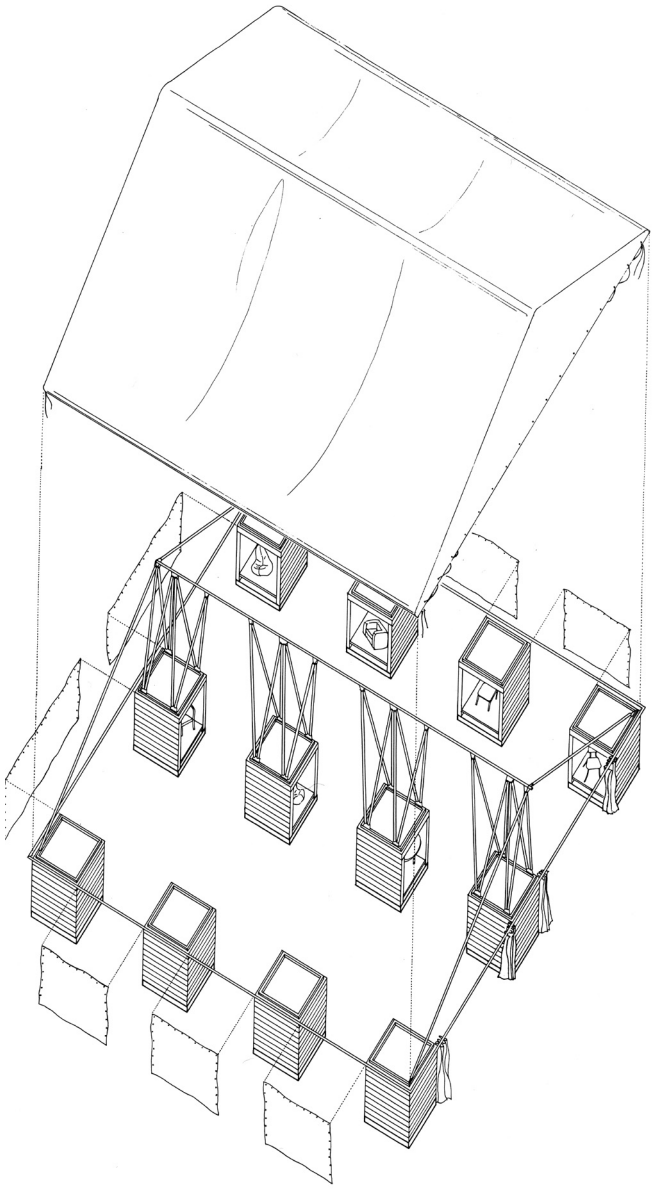
Installation
-

Foundation
No foundation necessary

Building character

Source / Photograph Credits
- JA 30, Shigeru Ban, The Japan Architect Co. Ltd, 1998
- Mc Quaid, Matilda: Shigeru Ban, Phaidon, London, New York, 2003, p. 235 f

*View



*Axonometric

Category
Modular
Rapid Assembly
Reusable
Small impact on landscape

Project
Drash S-Series
S6 module

Author
DHS Systems

Short description
Lightweight and modular shelter system with low packed volume, which is man portable and easy and fast to erect. Drash comes as one package. Four people erect the shelter in 5 to 10 minutes. No tools are required for the erection and no looking devices are necessary.
DHS Systems offer 42 different single shelter modules from 8 to 102 m². The S-Series ist available in 12 different sizes: All S-Shelters are 4,1m wide and increase in length by increments of 1,5m starting at a length of 4,1m. The interior height is 2,50m. There is an average of 30cm of air-space between the exterior and the interior covers to provide thermal insulation. The Shelter includes screen windows, screen doors, ground cover. The packed dimensions are 1,68 x 1,02 x 0,56m and the total weight is 228kg.
Mobile trailers with power generation & environmental control units, lighting, heating, power distribution & logistical support are available

Site
Worldwide

Year
2004

Program
Field Office
Hospital Camp
Field office

m²
37,5 S6 module

(outside: 11,7 x 4,1 x 3,3m)
(inside: 10,4 x 3,5 x 2,5m)

Cost
574 € / m²

(total 21.516 €)

useful life, intended
Single use: < 1 year
Total life span: > 10 years

Recyclability
Reusable

Construction
TITANITE frame with preattached XYTEX Covers.
(Structure and membrane are one)

Material
Membrane: XYTEX
Shelter frame: TITANITE

Installation
Fluorescent lights
electrical cable and edu duct ports

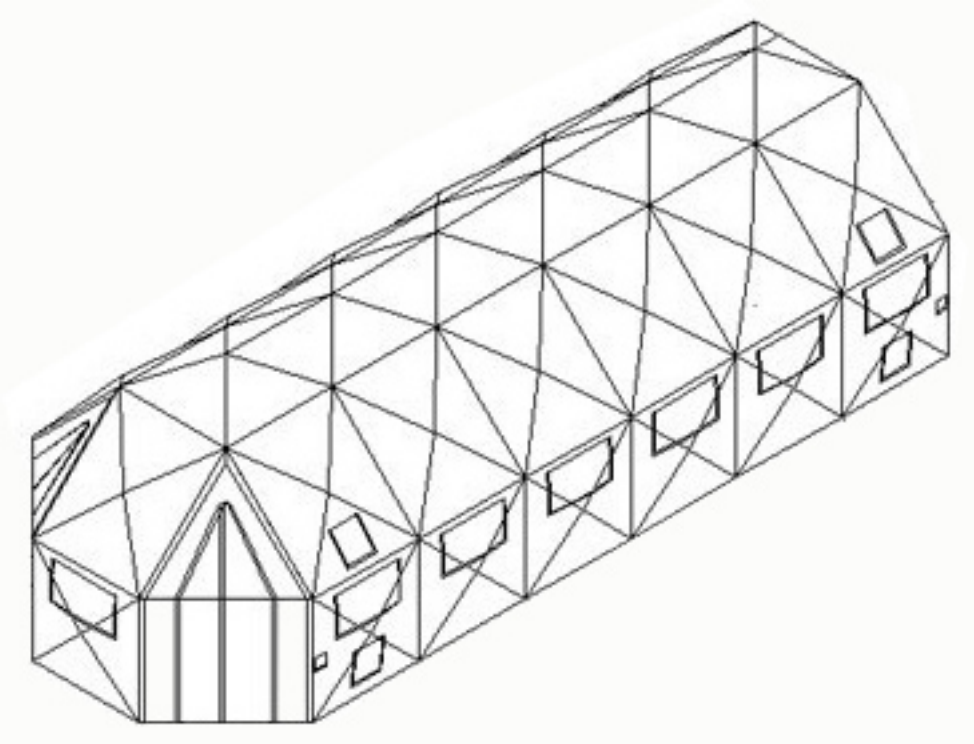
Mobile trailer with power generation

Foundation
No foundation necessary

Building character

Source / Photograph Credits
- www.drash.com
- manufacturer`s information
- Interview with Travis Dunn, 6.12.2005

*View



*Axonemetric
Interior view

I | 200 | 0 10 20

Category
Modular
Rapid Assembly
Reusable
Small impact on landscape

Project
Mobile-office

Author
Alho Fagsi

Short description
Interims-architecture for mobile offices. The prefabricated modular building system is flexible, expandable and reusable and is made for medium to long-time temporary use. The company offers 4 different basic modules in different price categories. Just-in-time production.

Site
Europe

Year
2004

Program
Offices

m²
18 m² office-container
(6 x 3 x 2,5 m)

Cost
600 € / m²

(total: ~10.000 €)

useful life, intended
single use: 1 - 5 years
total life span: > 20 years

Recyclability
reusable

Construction
Modular steel-frame system

Material
Construction: Steel
Facade: galvanized steel panels with insulation (PU-Sandwich)

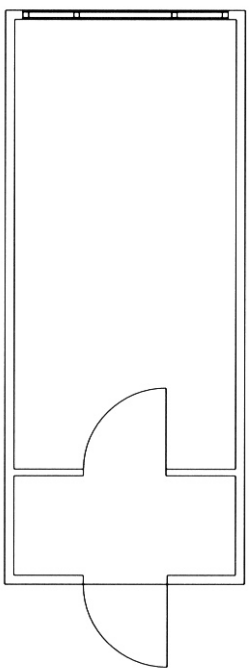
Installation
- pre-instalated power, gas and water installation in sandwich wall.
- electronical heating / radiator

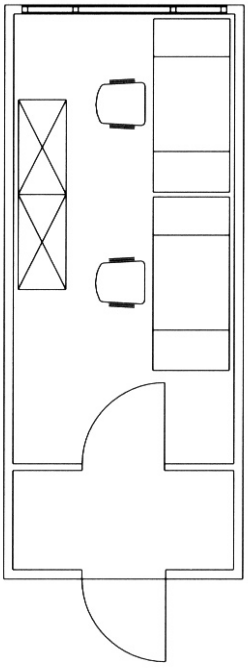
Foundation
single story:
- no foundation necessary
multiple stories:
- strip foundation or concrete slab

Building character

Source / Photograph Credits
- DBZ 5/2001, Stahlraummodule im Objektbau, p. 86-89
- www.alho.de
- Alho Immotions; Maufacturer`s Information, 2005

*View





*Plan

P 200 0 10 20

Category
Modular

Project
Modular System USM-Haller (MIDI ARMILLA)

Author
Haller, Fritz

Short description
The building for teaching rooms and laboratories for natural sciences of a Kanton school is build with the USM-Haller modular system (MIDI ARMILLA). Two-storey, free-standing school extension, executed in a unit construction system, comprising load-bearing structure, service modules as well as floor, partition and facade infill elements. The components of this non-directional geometric system - especially the internal partitions, service networks and connections for fittings and installations - can be combined in a variety of ways. Load-bearing structure of a system of columns and combined trussed and Vierendeel girders. No distiction between intermediate and peripheral beams, thus unlimited extendability. Electrical and sanitary networks planned by computer programme for the layout of mechanical services in adaptable buildings. Wall elements assembled on the floors and contain no installations, thus facilitating later changes.

Site
Solothurn, Switzerland

Year
1992

Program
School

m²
2767 m² GF

5535 m² BGF

Cost
1481 € / m²

(total: 8.198.465 €)

useful life, intended
Permanent

Recyclability
No recycling concept

Construction
structure: steel frame system (columns and hybrid trussed / Vierendeel girders)

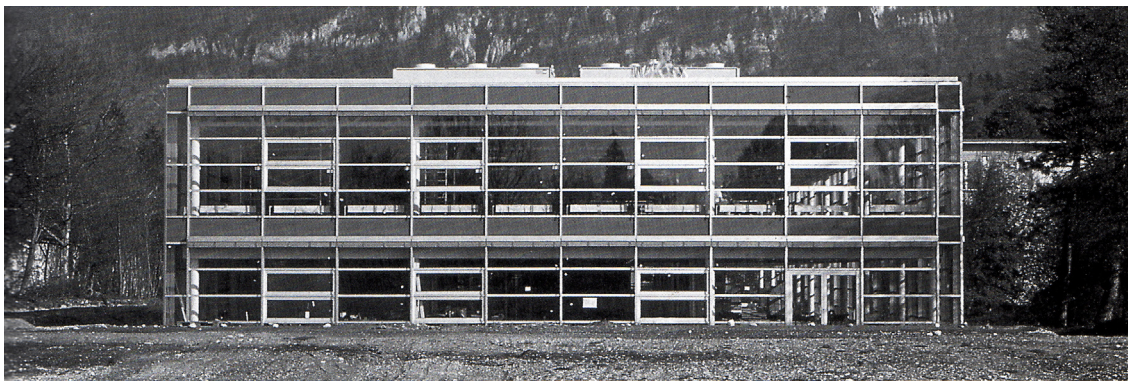
Material
Construction: Steel
floors: precast concrete slabs
Facade: glass facade
Inner walls: compst. wall elements

Installation
Installations run within the load-bearing structure

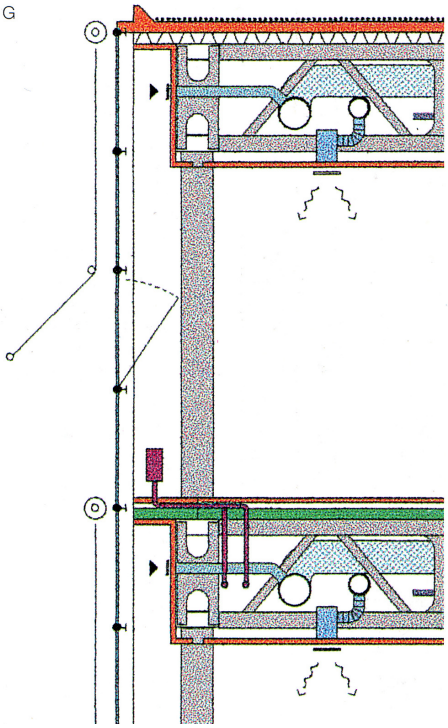
Foundation
Concrete slab

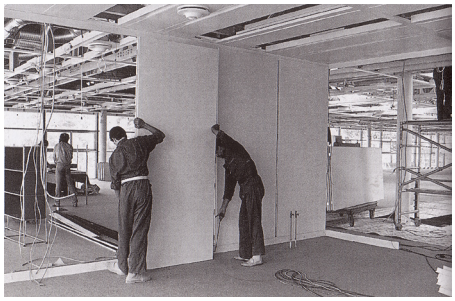
Building character

Source / Photograph Credits
- DETAIL #5 1998, S. 813-818
- DETAIL #4 2001, S. 608-610
- Fritz Haller, Bauen und Forschen GmbH



*View





*Detail / Assembly

Category
Low Budget
Modular
Reusable
Small impact on landscape

Project
Canon Showroom

Author
INFORM /
Spannbau

Short description
Exterior showroom for the presentation of Canon products during the IFA 2003 in Berlin. After two weeks in Berlin the exhibition went to 5 other cities in germany.

The tent system ist a modular system made up of 3 basic elements: the inner-, the middle- and the end-module. Each form and size can be adjusted according to the needs. The system can be used as a temporary building or as permanent extention for existing buildings. The construction composes out of semi-circular aluminium-arches. Pegs are necessary for the anchorage. For a team of 9 workers the assembly and disassembly takes as little as tree to four days.

Site
Potsdamer Platz, Berlin
Germany

Year
2003

Program
Exhibition

m²
1165

Cost
429 € / m²

(total: 500.000 €)

useful life, intended
Single use: < 1 year
Total life span: ~ 10 years

Recyclability
Reusable
Structure: Product recycling

Construction
aluminium structure

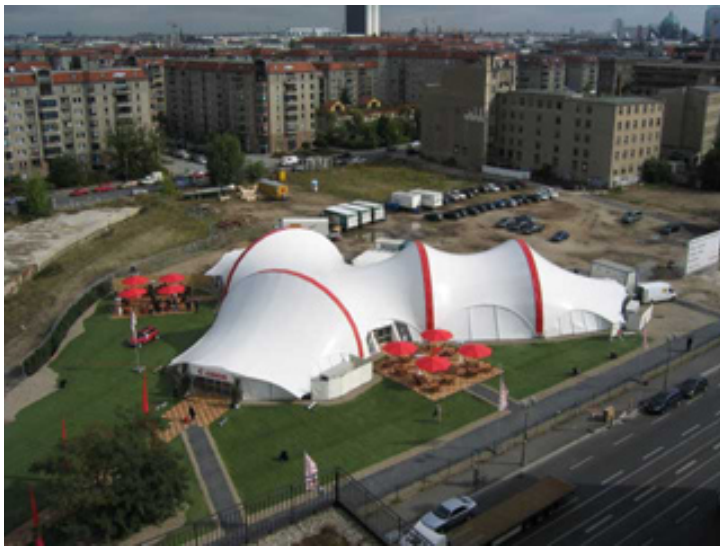
Material
skin: textile membrane
construction: aluminium
floor: wooden panels

Installation
GWP installation prepared under ground (80cm)
(depends on installation on site)

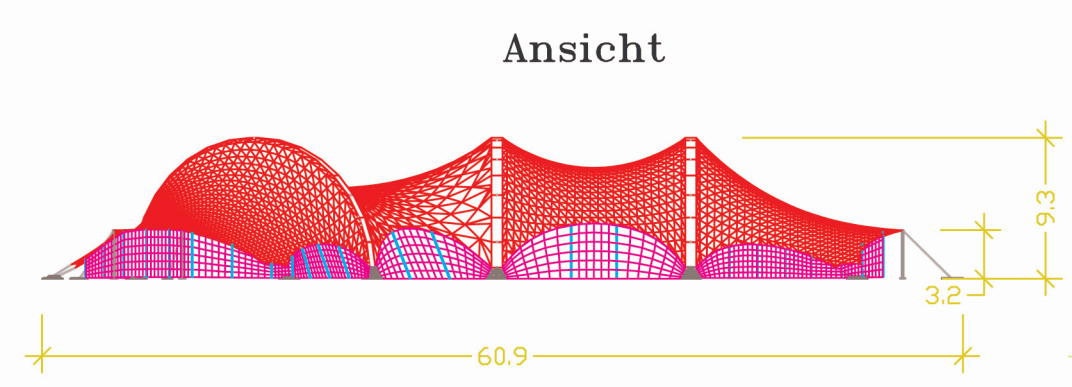
Foundation
no foundation necessary

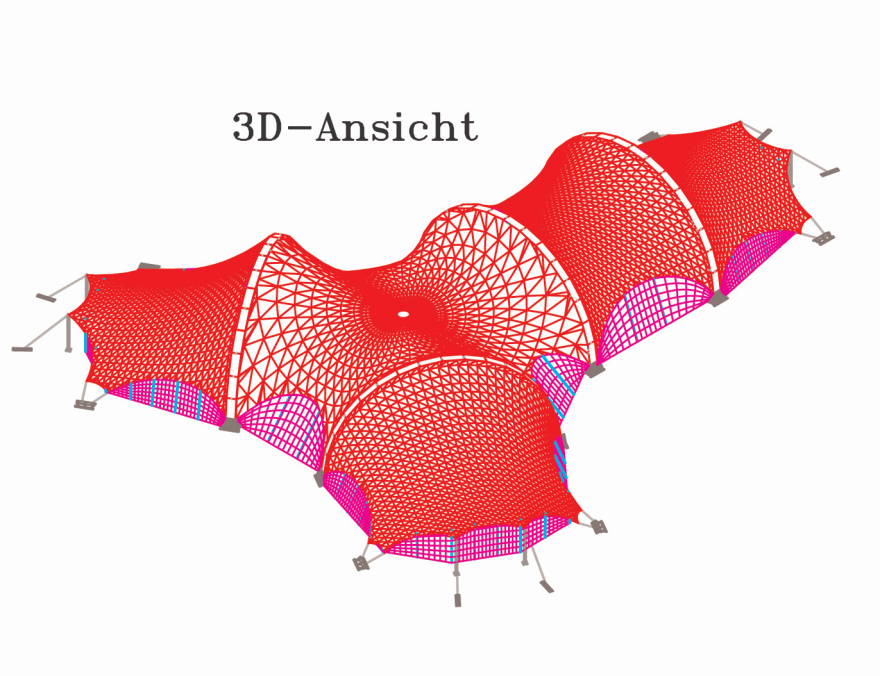
Building character

Source / Photograph Credits
- www.canon.de (4.9.2003)
- Horn “canon am Potzdamer Platz”, i+fc Industrie, 8/2003, p. 12 ff
-Agentur FCE www.first-class-events.com



*View





*Axonometric
Interior view

H 200 0 10 20

Category
Modular
Reusable

Project
Rathenow Housing

Author
Keim, Jochen
Sill, Klaus

Short description
Extension of existing building with housing and commercial use by adding prefabricated containers. The loadbearing structure of the extension consists of a precast concrete skeleton frame designed to support 12 prefabricated housing containers. These were assembled complete with sanitary and other services in a works 500 km from Rathenow. The cells were, therefore, executed in sizes that could be transported by road on a normal lorry. On site, the containers were hoisted into position by crane and "plugged into" the service systems. The containers are constructed of common industrial materials such as insulated wall and roof panels and corrugated aluminum sheeting. The base slabs are in reinforced concrete for reasons of fire protection.

Site
Rathenow, Germany

Year
1997

Program
Housing

m²
231

(12 containers of 21m² each)

Cost

useful life, intended
Permanent

Recyclability
No recycling concept, container reusable

Construction
Loadbearing structure: precast concrete skeleton

Material
Precast concrete, insulated wall and roof panels, glass, corrugated aluminum
Containers: insulated panels, aluminum sheeting, reiforced concrete slab

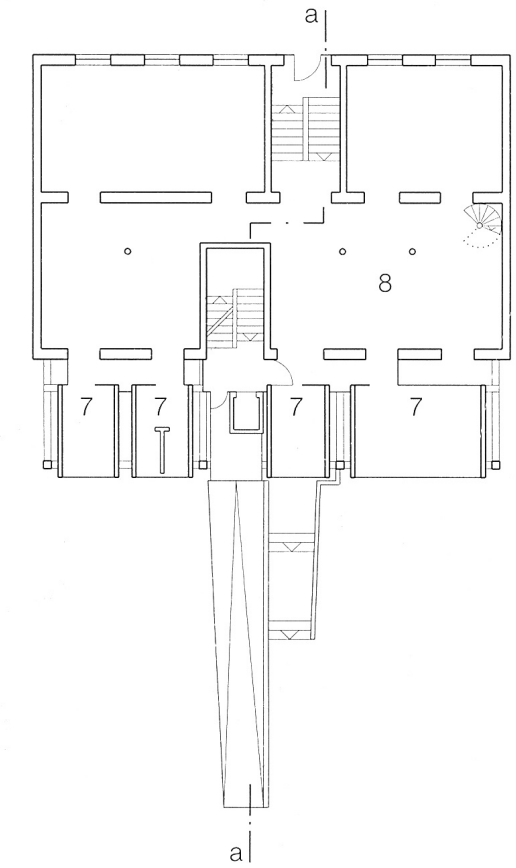
Installation
Containers connected to existing installations

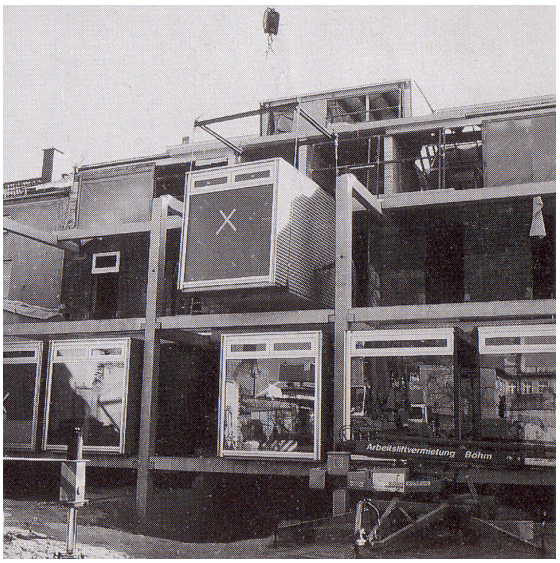
Foundation
Foundation necessary
(concrete slab)

Building character

Source / Photograph Credits
- DETAIL #5 1998, S. 808-812

*View





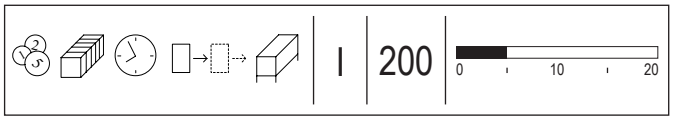
*Plan
Assembly

I | 200 | 0 10 20

Category	Project	Author	Short description	
Low budget Modular	Neckermann logistic center	Klebl	The logistic center is equipped with the latest warehouse and materials handling technics. The Neckermann Logistic Center provides space for 800.000 products. 32.000 products are sent from the logistic center daily. There are palletised in narrow aisles, which can be reached by forklifts.	
Site Heideloh (Bitterfeld) Germany	**Year** 1994	**Program** Logistic center		
m² 21.000 m² 420.000 m³	**Cost**	**useful life, intended** > 20 Years	**Recyclability** No	
Construction Steel + concrete	**Material** Construction: steel, concrete Facade: metal panels Prefabrications	**Installation** **Foundation** Concrete plate	**Building character**	**Source / Photograph Credits** - Susan Draeger, 1999 - http://www.neckermann.de/unternehmen/presse/index.mb1?mb_f020_id=dKBWDmKSIdMjajHLWHLP9&mb_v301_ch=4d8c0 - www.klebl.de

*View

*Interior view



Category
Modular
Rapid Assembly
Reusable
Small Impact on landscape

Project
Sanitary Container

Author
ADCO
TOI TOI & DIXI Sanitary System

Short description
Mobile Sanitary Systems from TOI TOI DIXI have an integrated tank, which is filled with water and bio-degradable sanitary concentrate. The tank will be pumped down regulary and disposed in clarification plants. The mobile sanitary container are provided with urinals and washbasins. They can be used everywhere, because the containers are completely independent from infrastructure, water supply, and canalisation.

Site
Europe

Year
1983

Program
Sanitary Service

m²
14,4

Cost
1805 € / m²

(total cost of sanitary container: 26.000 €)

useful life, intended
Single use: < 1 years
Total life span: > 20 years

Recyclability
Reusable

Construction
Steel construction

Material
- Coated Steel; external steel panels are coated with plastisol, a hard-wearing resin
- plastic (interior)

Installation
- Kombinierter Frisch- und Abwassertank (10m³)
- Fakalienhebeanlage
- Heizung, Stromanschluß

Foundation
Pad foundation

Building character

Source / Photograph Credits
- Interview mit Thomas Schult, TOI TOI Systeme, 13591 Berlin, 11/2005
- Herstellerinformation TOI TOI Sanitärsysteme

*View

P | 200 | 0 10 20

Category
Modular
Low Budget
Reusable
Small impact on landscape

Project
Inter-Action-Center

Author
Price, Cedric

Short description
Price realize much of the original spirit of the Fun Palace in his 1977 Inter-Action Centre, built in Kentish Town north of London. Inter-Action was a multi-purpose arts and community center, which provided community services for the residents. Price's design accommodated workshops, rehearsal rooms, studios, an assembly hall, classrooms, a childcare center, eating facilities, and administrative offices. The Centre was essentially an open framework into which modular elements (containers, portakabins) could be inserted and moved as required by programmatic changes. The materials and finishes were simple, straightforward, and expedient, suggesting conscious avoidance of aesthetics. Price viewed architecture as an embodiment of temporal events. He regarded the center as an ephemeral response to the needs of the community at that time, and considered it a temporary structure. He opposed efforts to have the Inter-Action Centre protected as an historical building, and called for its demolition. Shortly before Price's death in 2003 the Center was torn down.

Site
Kentish Town, London, UK

Year
1977

Program
Culture Centre

m²

Cost

useful life, intended
27 years

Recyclability
no recycling concept

Construction
steel frame construction

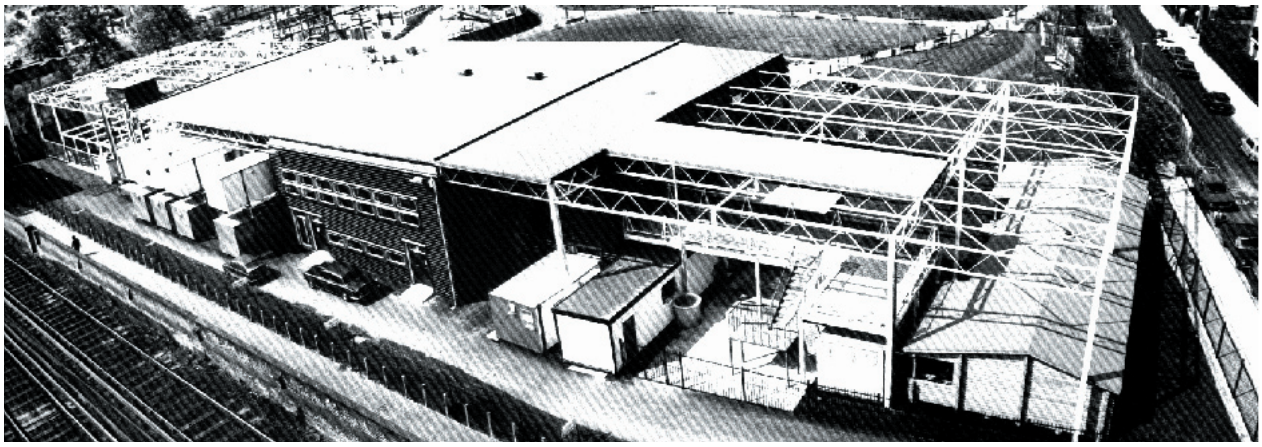
Material
Steel structure
External walls are clad in plastic-coated decking
Portakabins

Installation

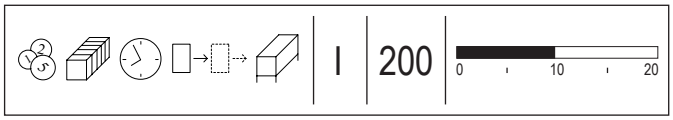
Foundation
no foundation
only point foundation for structure

Building character

Source / Photograph Credits
Price, Cedric: The Square Book, Wiley-Academy, 2003, p.63
Alsop, W.A.: Speculations on Cedric Price Architects' Inter-Action Centre, In: Architectural Record, 7-8/1977, S. 483ff
www.arch.columbia.edu/studio/spring99/jones/ac465/project/price/price.html



*View



Category
Low budget
Modular
Rapid Assembly, Reusable
Small impact on the landscape

Project
Multi purpose tent

Author
Röder Zeltsysteme

Short description
The modular light weight tent system can be used as production space, ware house, logistic center, sales and show room. The building is for sale, to rent or lease.
There is a great variety in sizes (25- >2000m²), floor panels, roff and wall constructions. The sides can be covered with soft materials like polyester membrane or with hard materials like metal panels, rollshutter, wooden panels etc.
It is possible to replace the whole tent with the crane.

Site
Europe

Year
2000

Program
Multi purpose space (exhibition, storage, sales room, garage, etc.)

m²
1500

Cost
76 € / m²

(total cost: 113.465 €)

useful life, intended
5-10 years

Recyclability
Reusable

Construction
Steel and aluminium structure (slidable system)

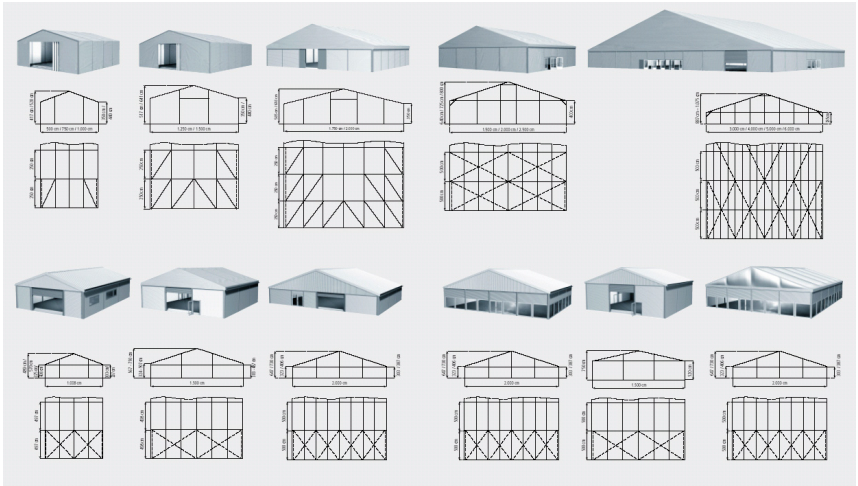
Material
skin: Polyester membran (low wick)
(optional: corrugated metal panels)
construction: steel structure, aluminium profiles
floor: wooden panels
(optional: metal panels)

Installation
Installation (climate technology, power, lighting) possible

Foundation
No foundation,
but ground anchors necessary

Building character

Source / Photograph Credits
- http://www.r-zs.de/de/download_center/Lagerzelte_GB.PDF
- www.r-zs.de
- Manufacturer Information



*View,
Different models: plan, section and view

H 200 0 10 20

Category
Modular

Project
Prefab House L1

Author
Simon Rümmle, Gerhard Ströhle

Short description
Flexible building system based on the principles of the automobile industry (optimized production processes, small amount of product platforms, many models). The structural carcass is build on site (foundation, steel coloumns and floor slabs). All other elements are prefabricated: walls with doors, windows and balconies, inner elements with leightweight sanitary cells or staircase (can be plugged in into the structure).
The energy concept is accomodated in an area smaller than 1m³ (ventilation, heating with solar energy, water installation). The construction period for a house could be reduced to 3 months.
Different sizes, facade designs and colours allow to individualize the houses.

Site
Vorarlberg, Austria

Year
2000

Program
housing

m²
GF 70 m²
BGF 142 m²

Cost
1000 € / m²

useful life, intended
permanent (30-50 years)

Recyclability
no recycling concept

Construction
Steel framework, filled with prefabricated wall elements

Material
construction: steel
prefabricated wall elements
(timber with thermal insulation)
staircase: glass-fibre reinforced plastic
floor: concrete slabs

Installation
integrated in the prefabricated elements
plug in system

Foundation
Concrete sole plate

Building character

Source / Photograph Credits
- Detail 2001, 4, p. 628 f
- www. fuerrot.at

*View

I | 200 | 0 10 20

Category Low budget Reusable, Rapid assembly Small impact on landscape	**Project** Airhouse	**Author** Struckmeyer Systembau	**Short description** Struckmeyer airhouse is a pneumatic construction made out of a plastic coated synthetic fiber membrane. Inside the building exists a high pressure of 3 mbar, which is so slightly that it is not perceivable by men. The mebrane is usually made out of one piece to minimize loss of pressure. The anchovage of the membrane to the soil is made by a special anchor. The assembly including the anchorage takes one week. The required storage space for the folded membrane (inclusive supllies) is 25 m².	
Site Germany	**Year** 1974	**Program** Sport Industry Exhibition		
m² 491	**Cost** 237 € / m²	**useful life, intended** Single use: < 1 year Total life span: > 10 years	**Recyclability** Reusable	
Construction Pneumatic Construction	**Material** Polyester membrane	**Installation** Climate technology, power, lighting included **Foundation** Ground anchors necessary	**Building character**	**Source / Photograph Credits** - Struckmeyer Systembau GmbH & Co.KG, Booklet - www.struckmeyer-systembau.de

*View
Membrane folded

I | 200 | 0 10 20

Category
Low budget
Modular
Rapid Assembly, Reusable
Small impact on landscape

Project
Uniteam Container

Author
Uniteam

Short description
Uniteam developed special container for Mobile Field Hospitals, Military Camps, Freight and Storage, Ballistic Protection, and for Housing and Office building. With the UNITEAM-Module system one can create complex offices and housing, which are expandable in 3 dimentions. The Assembly takes 1-2 days, depending on the complexity of the building. Possible is renting, leasing and buying. Installation supplys are Heating system (gas or electric), air-conditions, furniture, mini kitchen, sanitary)

Site
Worldwide

Year
2003

Program
Office, housing

m²
18

Cost
289 € / m²

useful life, intended
Single use: < 5 years
Total life span: permanent (20-30 y.)

Recyclability
Reusable

Construction
Steel construction

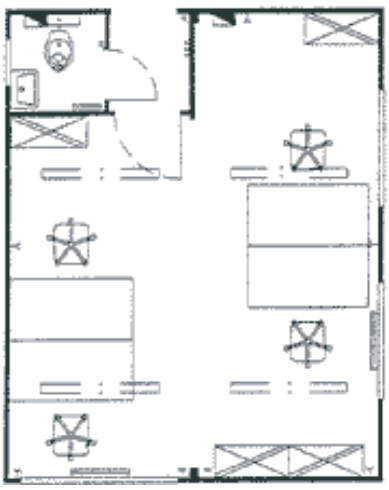
Material
Steel construction
Steel panels
Isulation

Installation
Heating system (gas or electric), lighting and power optional (air-conditions, furniture, mini kitchen, sanitary)

Foundation
No foundation necessary

Building character

Source / Photograph Credits
- http://www.uniteam-container-service.de/html/container.html
- http://www.uniteam.org/default.asp?Itemid=1187



*View
Plan

Category
Low budget
Modular
Rapid Assembly, Reusable
Small impact on landscape

Project
5. Designers' Saturday in Langenthal

Author
Stefan Zwicky

Short description
One day product presentation of textil- and furnitureproducers. Presentation for three companies (office furniture and light). Construction: Scaffolding (can be rented on a day-to-day basis, various sizes possible, easy assembly and dismantle, can be covered with membranes, enlighened from inside)

Installation in a big industrial hall: wall of wrapped scaffolding mark the entry, inside 6m high walls, parallel, to separate the different companies. Enlightment by simpel neon lamps.

Site
Langenthal, Switzerland

Year
1998

Program
exhibition

m²
800

Cost
17 € / m²

useful life, intended
Single use: 1 day
Total life span: > 5 years

Recyclability
Reusable (Scaffolding, clingwrap membrane)

Construction
Scaffolding

Material
Membrane (Clingwrap)
Metal (Scaffolding)

Installation
-

Foundation
Stands on the soil (no foundation)

Building character

Source / Photograph Credits
- Bauwelt 8, 2000, p.29 ff

*View

*Interior view

A | 50 | 0 10 20

Category
Low budget
Reusable
Small impact on landscape

Project
Strategies for subversive occupation

Author
Santiago Cirugeda

Short description
Santiago Cirugeda finds extra room for urban space in the residual, temporary, and forgotten. Heavy metal dumpsters normally rented by the day for the disposal needs of construction crews are filled with grass, dirt and seesaws to create playgrounds of bucolic pleasure. Scaffolding provides structure for the metal cladding needed to shelter one, in a small building that clings to the side of a building like a barnacle.

The speed at which changes take place in urban space suggests specific places and given epochs, so the design and construction of this space constantly require regenerating mechanisms which address the particular factors of the various places and their interaction with global changes and systems.

Site
Sevilla, Spain

Year
2002

Program
Art installation
shelter

m²
various sizes

Cost

useful life, intended
< 1 year

Recyclability
Reusable

Construction
Scaffolding structure
Container structure

Material
Steel, membrane, container

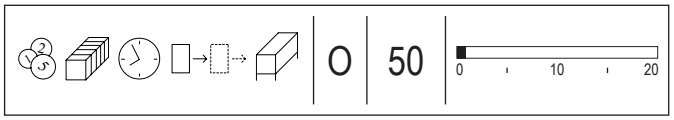
Installation
No installation

Foundation
No foundation

Building character

Source / Photograph Credits
www.trans-formers.org/arists_1/301_cirugenda.htm

*View



Category
Low budget
Modular
Rapid assembly, Reusable
Small impact on the landscape

Project
Typ LA-291+

Author
Layher scaffold system
LIA
Laboratory for Integrative Architecture / TU Berlin

Short description
The scaffold system is a modular system and very easy and fast to errect (there is no need for any tools except a hammer). Scaffold construction protection (with panels or membrane), roof system, diagonal form and tribune construction are also possible.
Various modules. "Blitzmodul": 2.2 m² (3.07 x 0.73 x 2.00; 338 €).
The scaffolding system can be used as event hall, exhibition space or show room.
The building can be rented, leased or bought. There is a great variety in sizes and floor and facade panels

Site
Berlin

Year
2004

Program
Construction system
Multi purpose space (exhibition, sport, event, showroom)

m²
400

(40 x 10 x 8m)

Cost
~ 600 € / m²
~ 430 € / m² (Rent)

useful life, intended
Single use: < 1 year
Total life span: > 10 years

Recyclability
Reusable

Construction
Metal scaffold construction

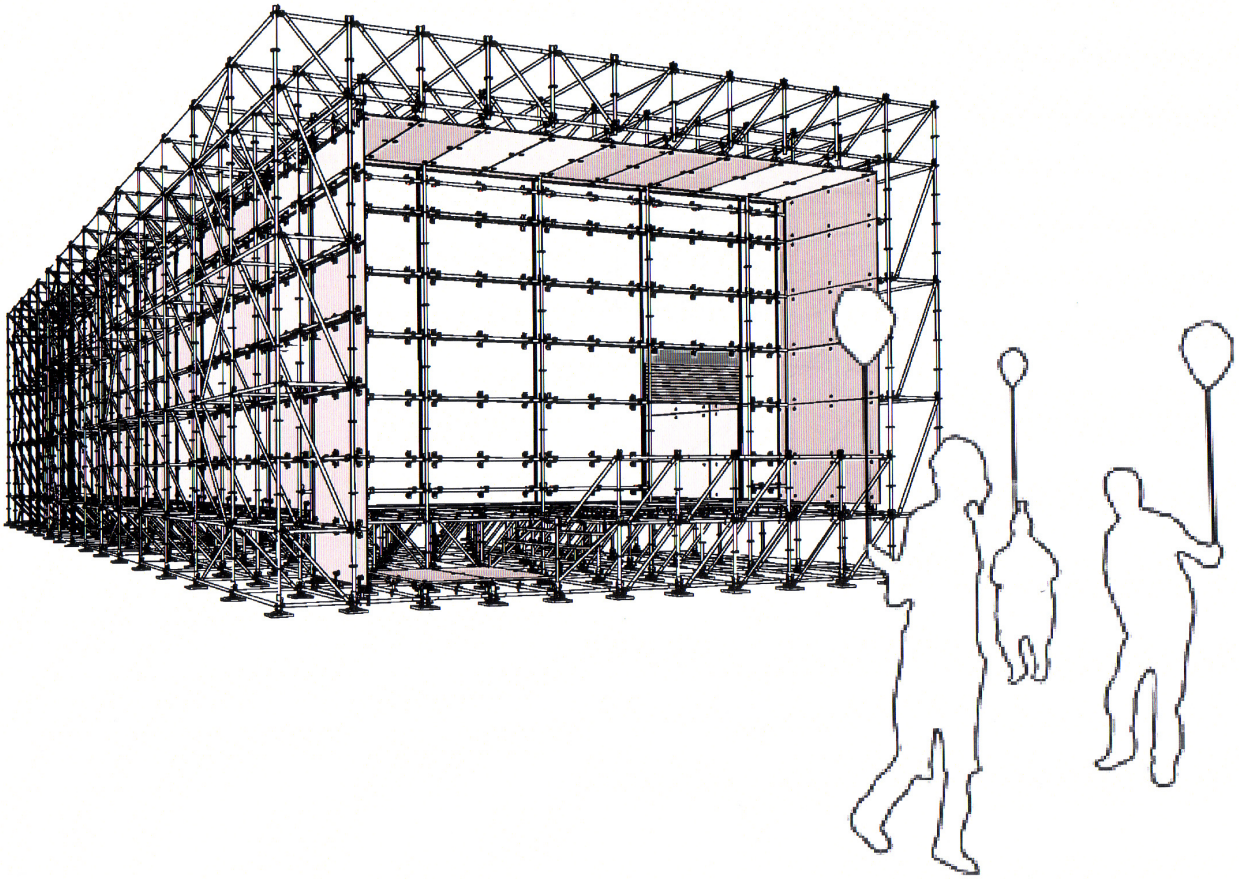
Material
structure: Steel or aluminum
skin: different choices
floor: metal or wooden panels

Installation
no installation

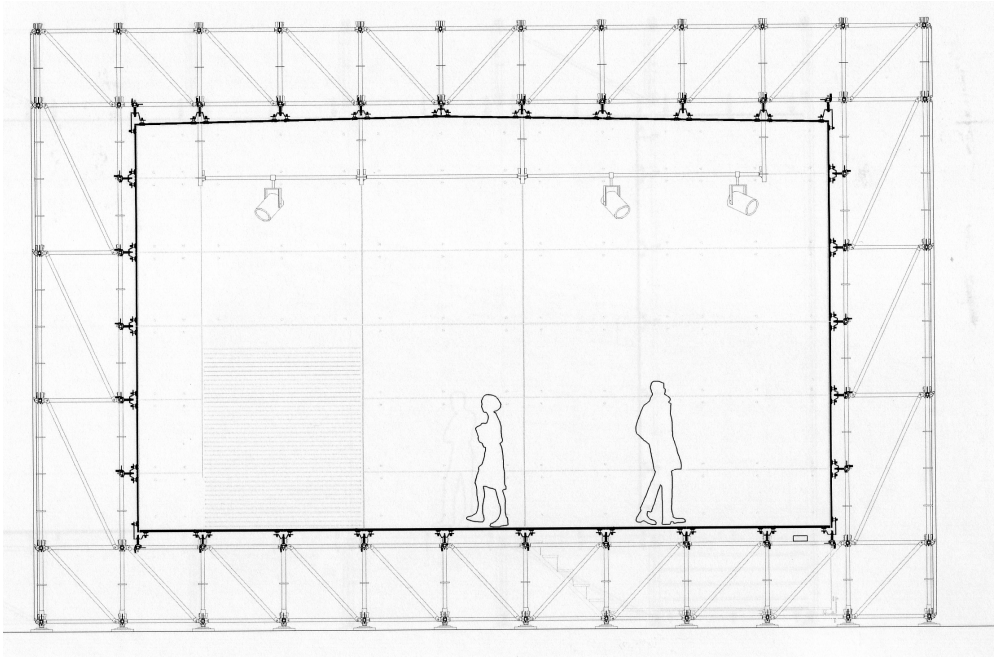
Foundation
No foundation necessary

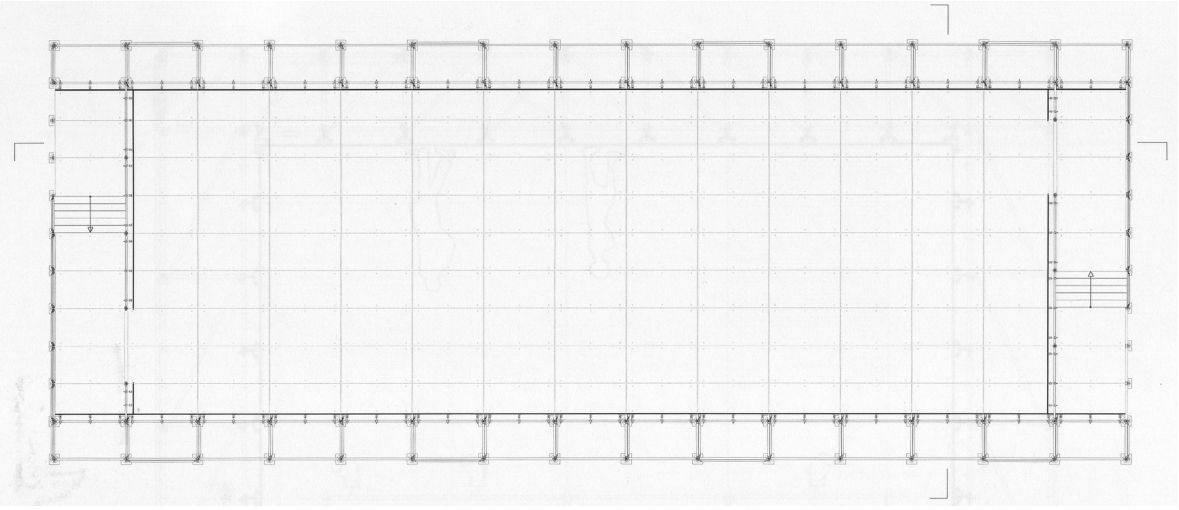
Building character

Source / Photograph Credits
- www.layher.com
- Layher, Wilhelm: "Layher - das Gerüstsystem", Technik-Broschüre, 2003



*Perspective





*Section
Plan

2 Industrielle Prototypen

Category
Modular
Reusable
Small impact on landscape

Project
Unit Construction System
for Pavilions

Author
4a
(M. Burkart, E. Pritzer, A. v. Salmuth, E. Tillmanns)

Short description
Unit construction system for provisional buildings . Based on a unit of 4,85 x 4,85 m with a 2,80 m clear room height.
The structure can be extended in any direction and comprises a system of quickly assembled bolted steel coloumns and beams. A choice of roof forms, canopies and other elements as well as a wide range of materials allows gread variation. Internally, partitions can be inserted to create diffent zones. The pavilion can be deconstructed and reerected in a different form.

Site
Europe

Year
1996

Program
Exhibition

m²
47

Cost
1490 € / m²

useful life, intended
Single use: 1-5 years
Total lifespan: > 10 years

Recyclability
Reusable

Construction
Bolted steel coloumns and beams

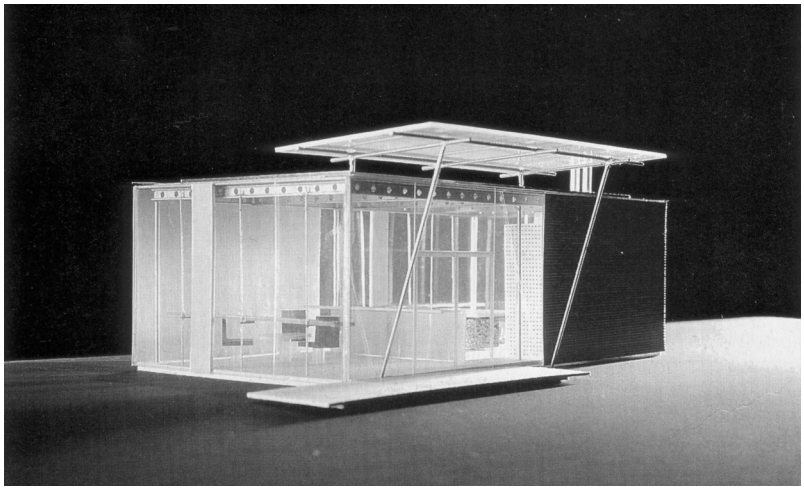
Material
Roof: composite roofing panel: trapezoidal-section sheet steel, insulation
Panels: double glazing and other materials

Installation
optional

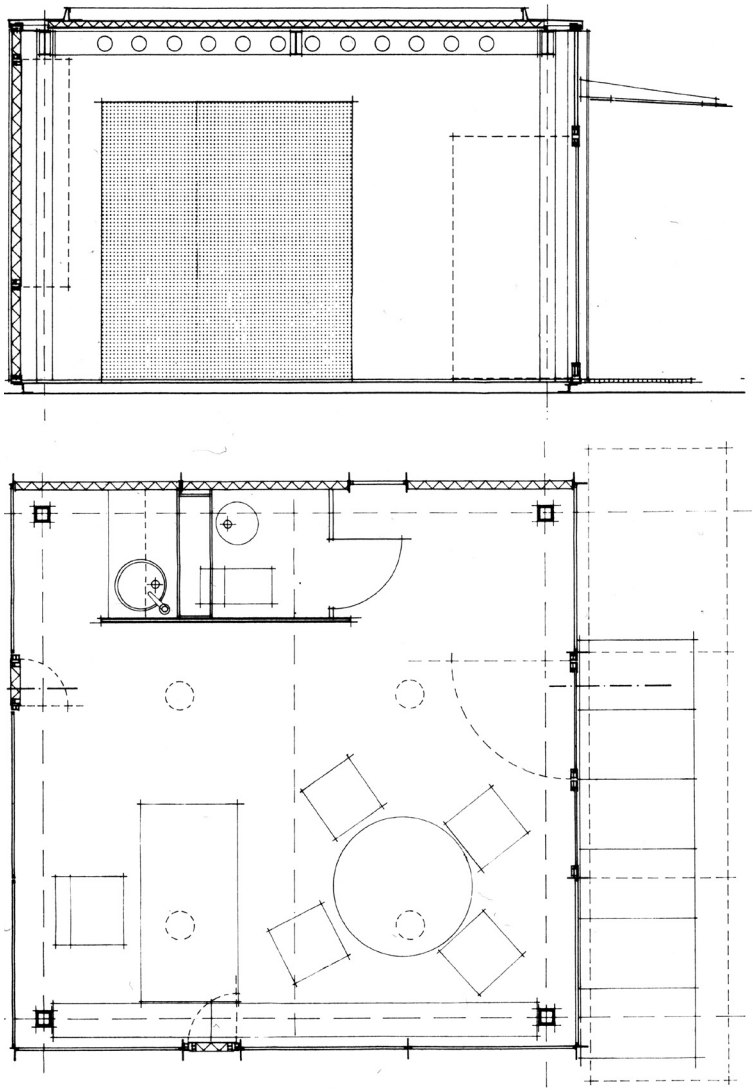
Foundation
Single bases

Building character

Source / Photograph Credits
- Detail 1996, 8, p.1217 ff
- DB 03, 1993, p. 76-78



*View

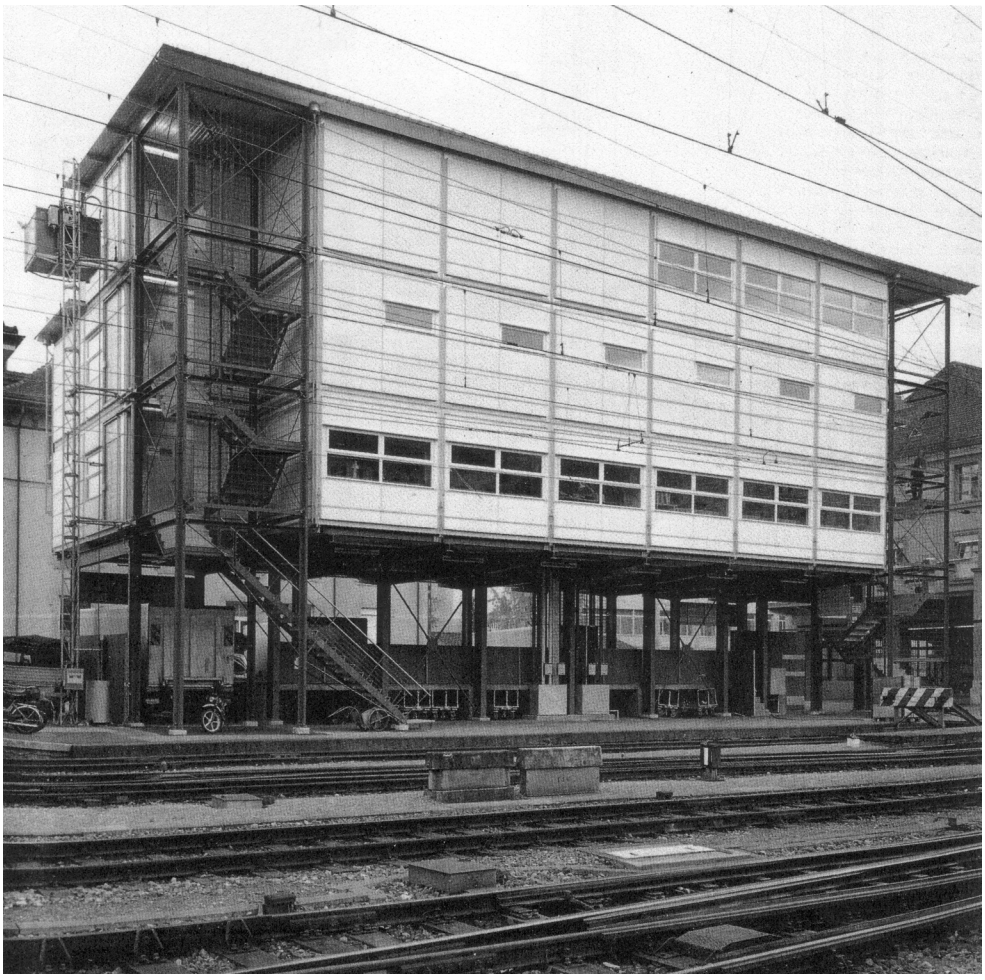


*Section
Plan

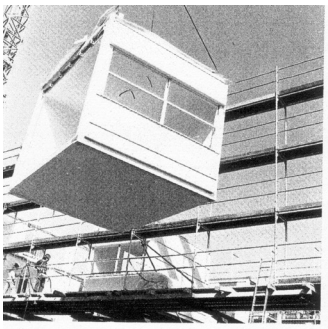
I | 200 | 0 10 20

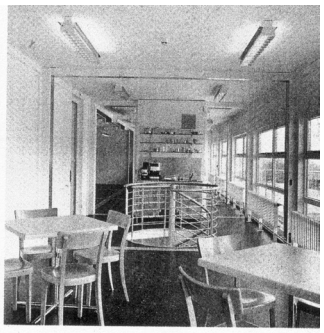
Category	Project	Author	Short description
Modular Reusable	Temporary Office Building	Bauart Architekten	Temporary office building. 57 identical cells stacked to form a three storey structure, raised above the ground in a steel structure to make room for railway loading platforms. The addition of the cubes creates a spatial grid with a double layer floor division between all cells (sound insulationa and fire resistance). Staircase and lift are independent external steel structures. Variations in size are possible, since individual coloumns can be omitted.
Site Neuchâtel, Switzerland	**Year** 1996	**Program** offices	
m² BGF 684 m² GF 264 m²	**Cost** 1700 € / m²	**useful life, intended** 10 years total lifespan > 20 years	**Recyclability** no recycling concept, material recycling possible
Construction cells: framework of L-shape laminated timber members elevation: steel structure	**Material** wood, steel	**Installation** electric inst. at the joints, water inst. in separated ducts. **Foundation** concrete	**Building character**

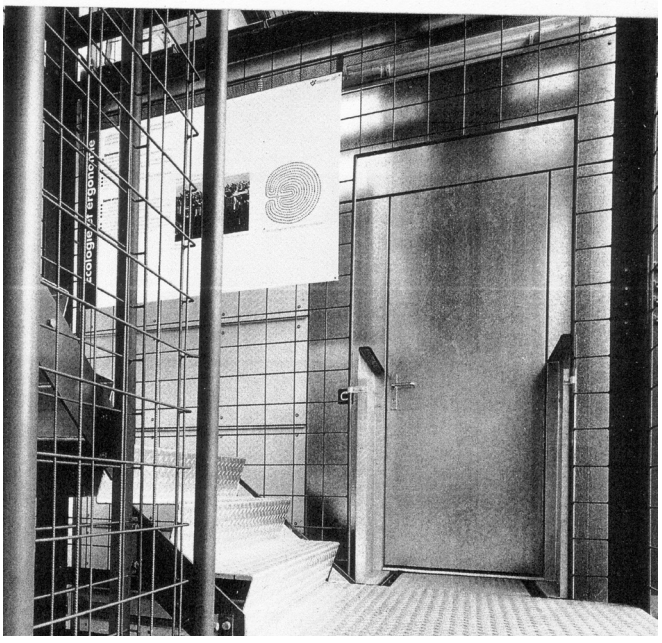
Source / Photograph Credits
- Detail 1996, 8, p.1226 ff



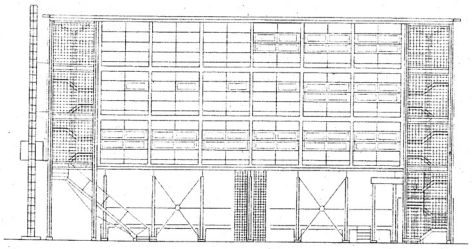
*View



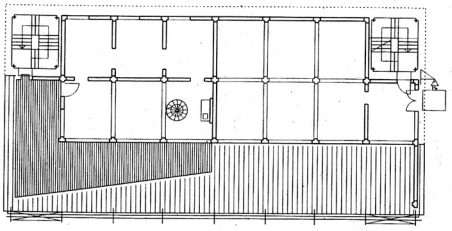




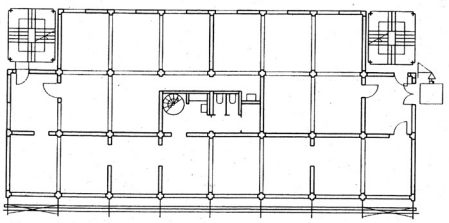
A



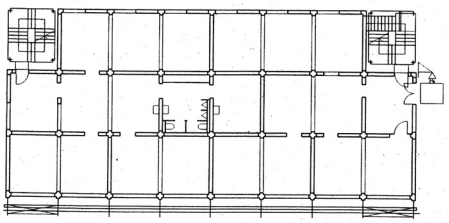
C



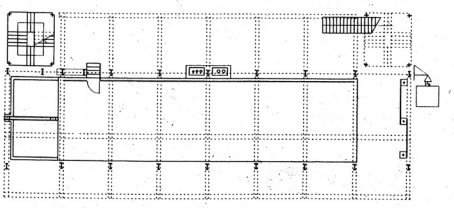
D



E



F



*Elevation - Plans
Interior view, office
staircase

Category
Modular
Recycling
Small impact on landscape

Project
Modular-Thun School

Author
Bauart Architekten

Short description
In einem Quartier der Stadt Thun, in dem rasch und möglicherweise nur für eine begrenzte Zeitdauer Raum für eine grosse Zahl von Kindern im schulpflichtigen Alter nötig war, wurden vier ein- bis zweigeschossige Schulbauten realisiert.
Für die zu erwartenden Funktionen und Anwendungsbereiche wurde ein einheitliches Modulmass gewählt. Die Abmessungen wurden so optimiert, dass - insbesondere im schulischen Bereich - die geltenden Normen und Richtlinien eingehalten werden können.
Das System Modular-Thun lässt sich auf einfache Weise aufstocken und erweitern. Für Anbauten kann die Fassadenschicht demontiert und die neuen Elemente nach Wunsch angebaut werden.

Site
Thun, Switzerland

Year
1998

Program
School

m²
446

Cost
1700 € / m²

useful life, intended
> 5 years

Recyclability
no recycling concept
material recycling (wood) possible

Construction
Holzmodulbauweise mit
Modular Thun

Material
Wood
Prefabricated elements

Installation

Foundation

Building character

Source / Photograph Credits
- www.bauart.ch

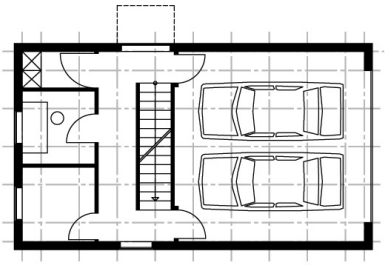
*View

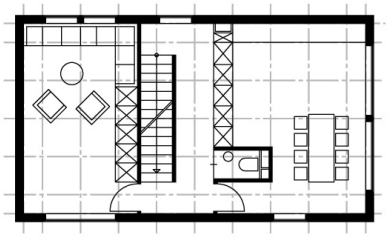
*View

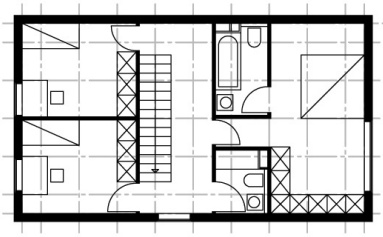
H | 200 | 0 10 20

Category	Project	Author	Short description	
Low Budget Modular Recycling	oa.sys	H. Berlinger, Oskar Leo Kaufmann, Albert Ruef	Building elements which allow individual, easy to build and low budget buildings for housing or industrial use. The system of the building is a 1,20m grid. The elements are usually out of wood and will be build by Berlinger Holzbau.	
Site Europe	**Year** 2000	**Program** Housing, office		
m² BFG 194,40 m² GF 64,80 m²	**Cost** 1000 € / m²	**useful life, intended** permanent	**Recyclability** no recycling concept, material recycling possible	
Construction Wood framework	**Material** Wood construction, wood for wall elements	**Installation** Various choices possible **Foundation** Concrete plate	**Building character**	**Source / Photograph Credits** www.oa-sys.com

*View







*Axonometric
Plans

H | 200 | 0 10 20

Category
Low Budget
Reusable
Small impact on landscape

Project
Dymaxion House

Author
R. Buckminster Fuller

Short description
Idea of a self-sustaining house. 3 Types: Basic Design (1927), DDU (Dymaxion Development Unit(1940/41)), Wichita Dwelling Machine (1946).
All were held by a central column or mast in with the installation (power, heating, water) at witch the story or the floor construction was suspended. Beneath was the space for the car. All rooms were on one floor. The house should be autarkic (water preparation, solar cells on the mast) was ready furnished (blow up and fold-away furniture) and could be shipped worldwide in this own metal tube. The first version (diameter: 15 m) was hexagonally (later versions were round) and had an extra level, used as terrace.
It should be a cheap (price of a Cadillac) mass produced house, but it never achieved mass production, except the DDU for military use (several hundreds were produced).

Site
USA

Year
1927

Program
Housing

m²
4D house: 146 m²

Cost
3000 $ (1927)

useful life, intended
Permanent

Recyclability
no recycling concept

Construction
Central mast at which the whole house was suspended.

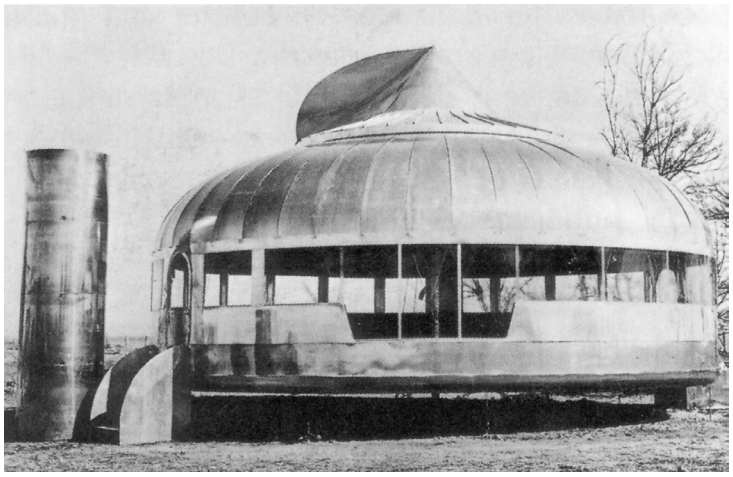
Material
Steel, aluminium alloys, plexiglass (minimum of weight)

Installation
- All installation infrastructure in the central mast.
Water preparation, solar cells on the mast

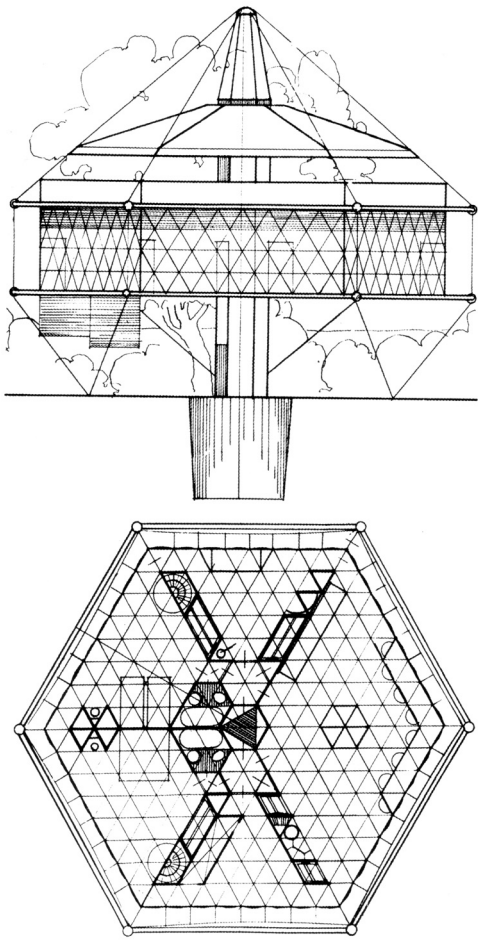
Foundation
Minimum surface contact due to the tension suspension from the central mast. No surface sealing

Building character
-

Source / Photograph Credits
- Krausse, J., Lichtenstein, C. [Hrsg.] (1999): Your private sky: Design als Kunst einer Wissenschaft. R. Buckminster Fuller. Müller/Baden: 122-145
- Krausse, J., Lichtenstein, C. [Hrsg.] (2001): Your private sky: Discourse. R. Buckminster Fuller. Müller/Baden: 82-105
- Ludwig, Matthias: Mobile Architektur, Geschichte und Entwicklung transportabler und mobiler Bauten, Deutsche Verlagsanstalt Stuttgart, 1998, p.106 ff



*4D-house:
elevation - plan
individual parts - assembled

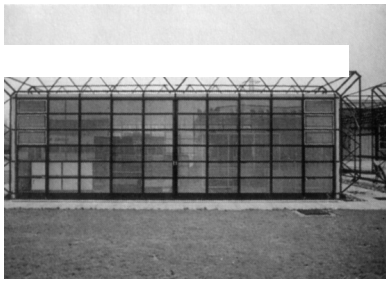


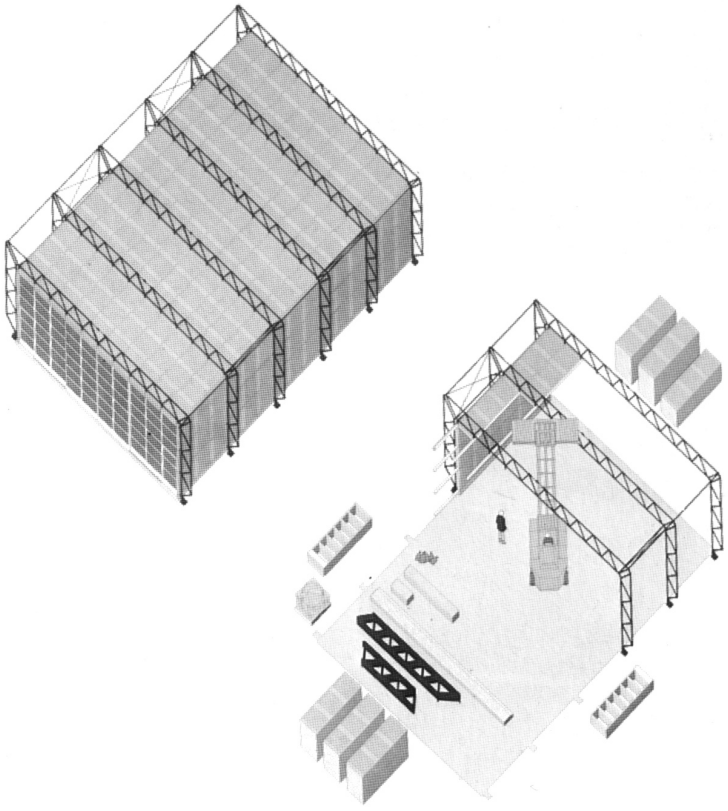
*Wichita Dwelling machine

I | 200 | 0 10 20

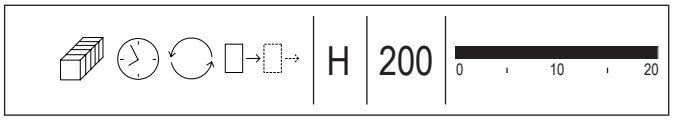
Category	Project	Author	Short description
Modular Reusable	Patera Building System	Hopkins, Michael	The company Patera Products Limited asked for a modular system based on small elements, which can be used as industrial building as well as for office and trade building. Patera was not developed as a single building but as a modular construction system with prefabricated structure and wall elements, which are so small that they are easy to handle, transport and erect. The sandwich panels with mineral fiber isolation between metal plates are used for fasade and roof. The building can be expanded or reused. Michael Hopkins developed the System "Patera" for temporary exhibition pavilions for an architecture festival.
Site UK	**Year** 1980	**Program** Industry	
m² GF 1080 m² 216 m2 each module (18 x12 m, height 3,5 m)	**Cost**	**useful life, intended** permanent	**Recyclability** Reusable
Construction prefab steel structure elements, outside of building	**Material** prefab sandwich panels for fasade and roof prefab steel structure elements	**Installation** Power cable and water installation are integrated in sandwich panels. **Foundation** concrete sole plate	**Building character**

Source / Photograph Credits
- Industriebau, K. Ackermann, DVA, 1994, p.108
- www.archinform.de/projekte/5503.htm
- Bayerer, Peter: Fakten für die Hosentasche Nr. 1, Flexible Bauten, UdK Berlin, 2003





*View
Axonometric diagram



Category
Modular
Rapid Assembly
Reusable
Recycling

Project
House Su-si

Author
Johannes Kaufmann, Oskar Leo Kaufmann

Short description
Transportable building unit in various sizes (10-14 m length, 3-3,5 m width, 3 m hight) and for various uses. Can be a dwelling in different uses or any office, atelier or pavilion.
It is prefabricated in one piece, with doors and windows. The units are transported by truck and erected on site using a mobile crane. Production takes 5 weeks, but installation of the building takes only 5 hours for the 30-50 m² building. The housing version has kitchen, bathroom and sleeping area. The building owner only has to prepare the foundation and the installation. It is also possible to build it on stilts.

Site
Europe

Year
1996

Program
Housing
Office
Pavilion...

m²
36

Cost
1750 € / m²

useful life, intended
permanent

Recyclability
material recycling (wood, insulation)

Construction
wooden truss construction with panels

Material
construction: wood framework
exterior walls: wood, insulation
interior walls: gypsum plaster board
glazed wall and window openings
(customer can select different woods or other materials, as well as interior finishes)

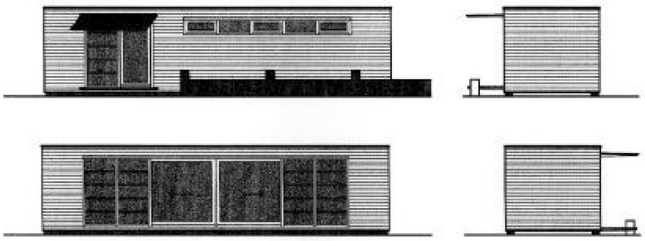
Installation
Incl. installation for kitchen and bathroom
(installation on site has to be prepared)

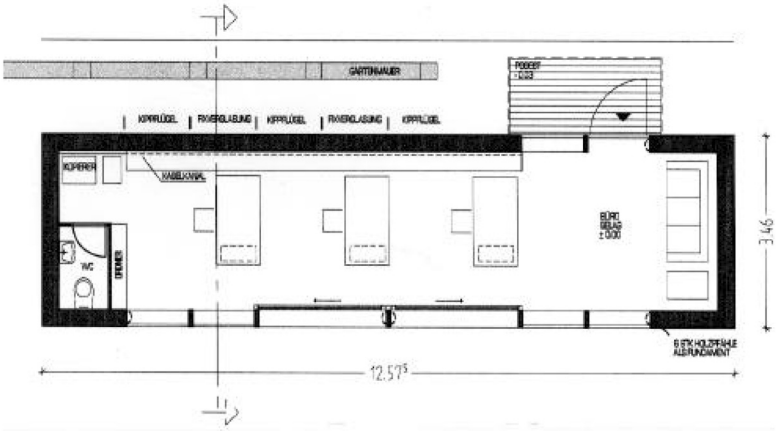
Foundation
concrete sole or wooden pile foundation

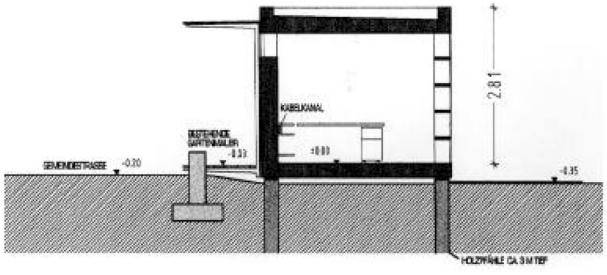
Building character
-

Source / Photograph Credits
- Richardson, Phyllis: XS:Big Ideas, Small Buildings, Thames & Hudson Ltd, London, 2001, p.166 ff
- www.jkarch.at
- www.olk.cc

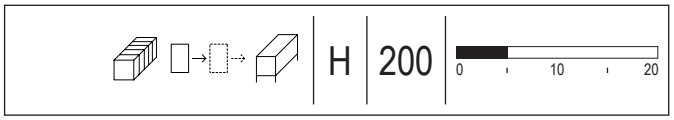
*View







*Elevation
Plan
Section



Category
Modular
Reusable
Small impact on landscape

Project
Secondhouse Project

Author
Koh Kitayama

Short description
The project was a study undertaken with the housing division of an automobile company.
The company`s research center studies various materials that are of great potential use for architecture.
A unit that is movable needs a self-sufficient system built into it so that it is not dependent on infrastructure attached to the land. The structure is designed so that it can be lifted on a truss and placed in a natural setting. The legs of the truss can be lengthend or shortened to fit any terrain. Materials that are as light as possible were chosen for the house to make it easy to transport.

Site
Fujino, Japan

Year
1998

Program
Housing

m²
64,8

(14,4 x 4,5)

Cost

useful life, intended
Single use: < 5 years
Total Lifespan: permanent

Recyclability
Reusable

Construction
light steel frame unit, 1 story

The legs of the truss can be lengthend or shortened to fit any terrain.

Material
light materials

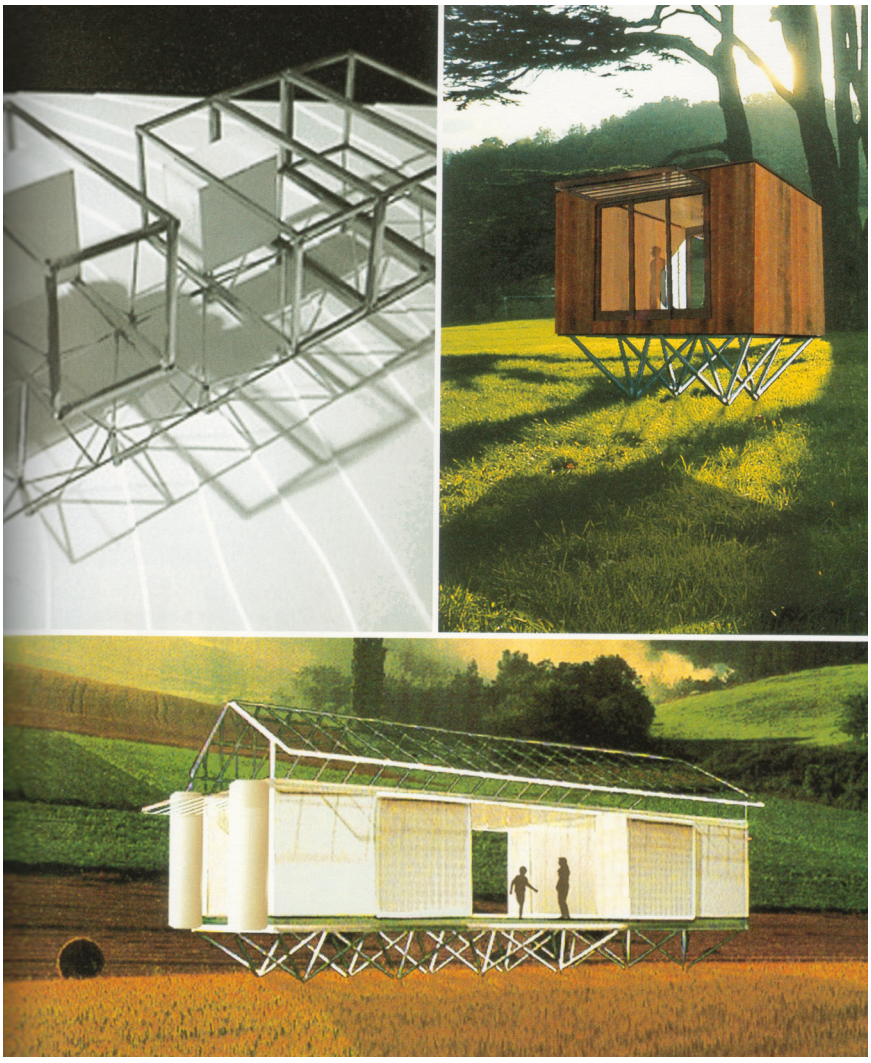
Studies various materials that are of great potential use for architecture.

Installation
Ecological and independent system: Self-sufficient system of water supply, drainage and energy (solar).

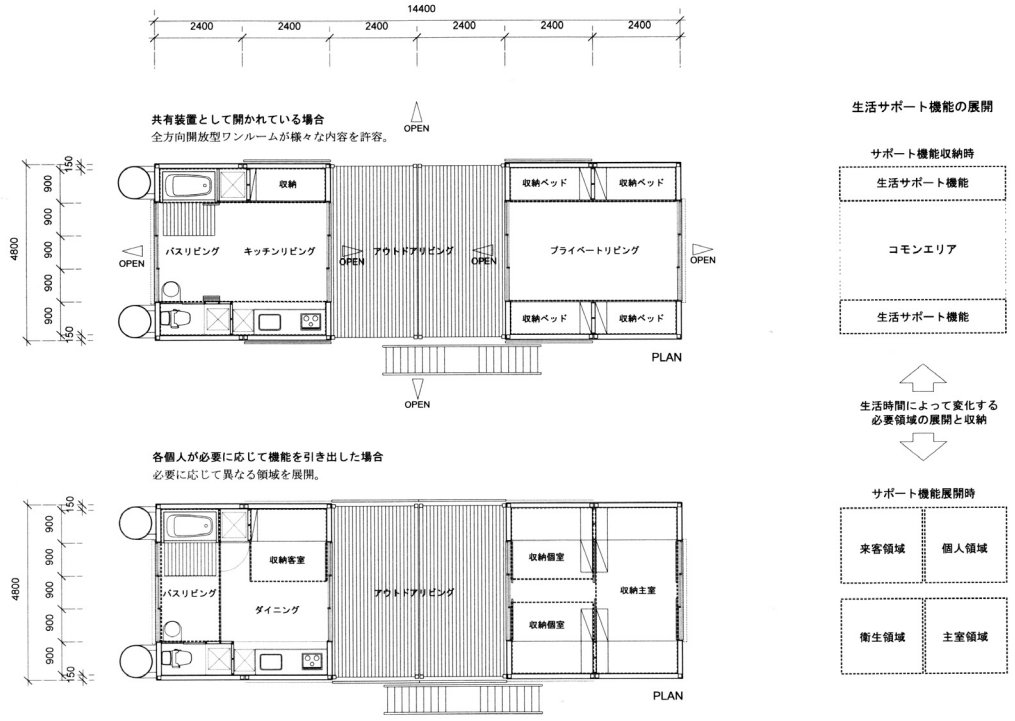
Foundation
Depending on soil conditions (point foundation maybe necessary)

Building character

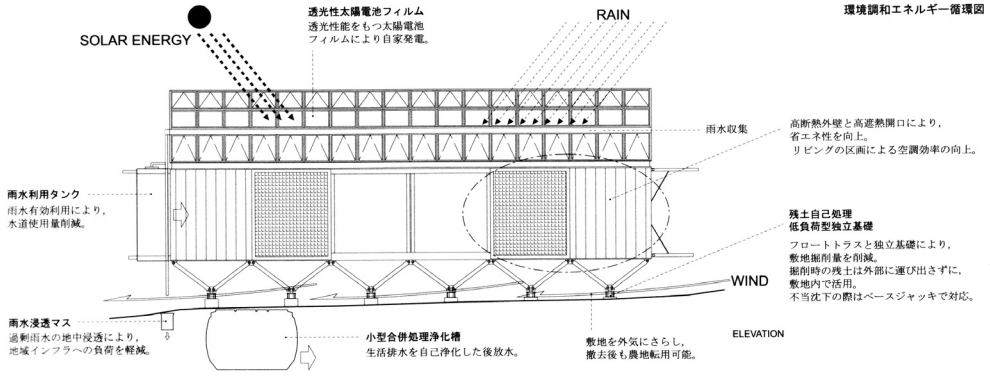
Source / Photograph Credits
- Kitayama, Koh: On the Situation, Koh Kitayama 1993/05-2002, Gallery Ma, Toto, Tokyo, 2002, p.144f



*Views



移動可能であるためには土地に付随するインフラに頼らない自給自足のシステムを内在する必要がある。そこで、この建築は給排水、エネルギーシステムを自給自足することにメリットのあるセカンドハウスとして計画した。自然敷地を想定するためトラスで本体を持ち上げる構造とし、トラスの脚の長さで土地の起伏に対応することにしている。



*Plans
Elevation

E | 200 | 0 10 20

Category
Modular
Reusable

Project
Modular Exhibition System (MAS)

Author
KSV Architekten, Krüger, Schubert, Vandreike (Berlin)

Short description
Exhibition system for BMW, based on ad grid to form various two storey constructions. Composed of few elements, high variability.
Functional-technical design to show the Cooroprate Design of BWM.

Site
Europe

Year
2000

Program
exhibition pavilion

m²
525

Cost

useful life, intended
Single use: 1 week - 5 years
Total lifespan: > 15 years

Recyclability
Reusable

Construction
Structure on a 1m grid of aluminium profiles for bearers and stilts (25x8cm) with bending resistant steel joints.

Material
Aluminium, steel

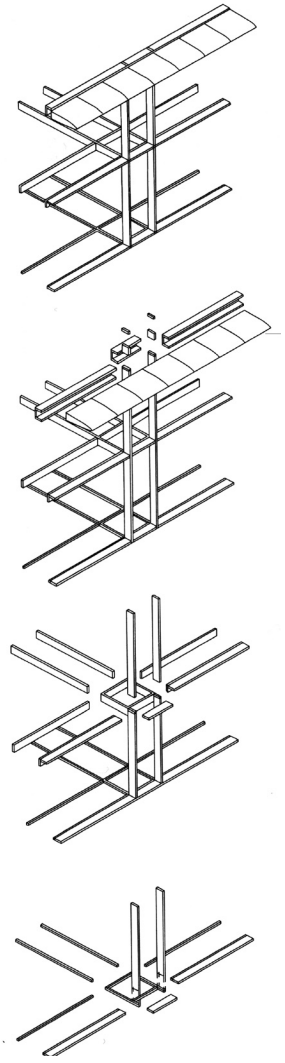
Installation
optional

Foundation
Foundation necessary

Building character

Source / Photograph Credits
- Bauwelt 8, 2000, p.22

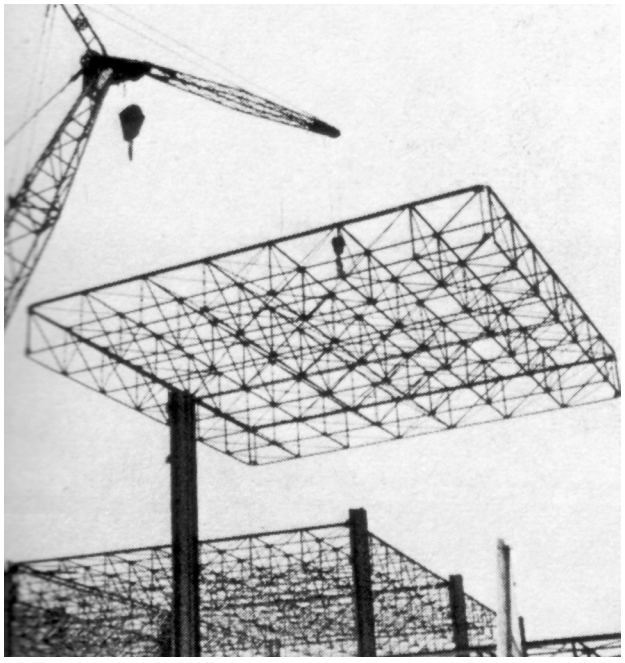
*View



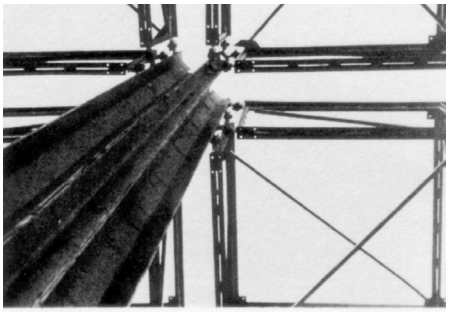
*Axonometric view - elements

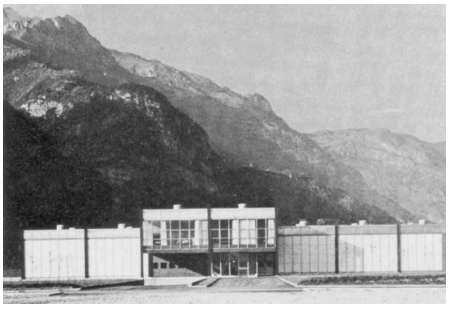
I | 200 | 0 10 20

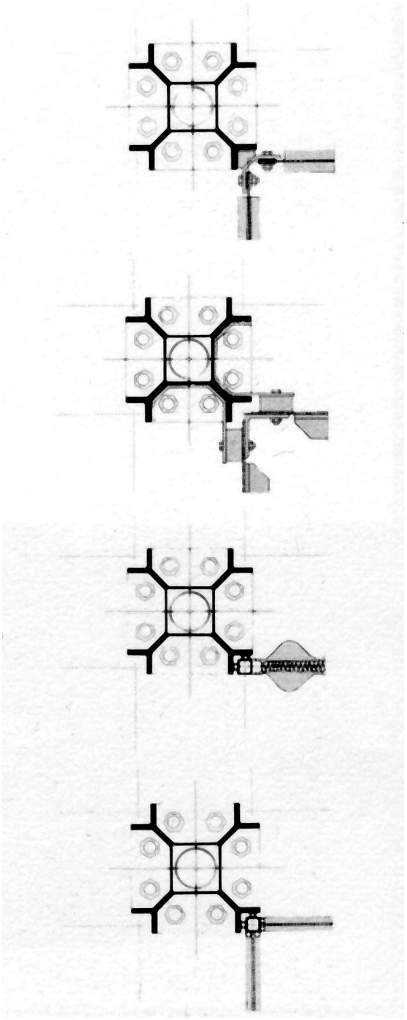
Category	Project	Author	Short description	
Modular	Factory in Longerone	Morasutti, Bruno	Factory, built with a system of extendable framework bearers. The 7,5 x 7,5 m framework fields are prefabricated and laid as a whole piece between the columns. The nodes at the four corners of the coloumns allow to connect either roof framework and inserted cieling or exterior and interior wall elements. The system is extendable in both horizontal directions.	
Site Longerone, Italy	Year 1967	Program Factory for electronic components		
m² 56,25 (one module)	Cost No information	useful life, intended permanent	Recyclability No recycling concept	
Construction Stell framework, built-in coloums with framework fields	Material Steel	Installation Foundation Foundation necessary	Building character	Source / Photograph Credits - Ackermann, Kurt (Hrsg.), Industriebau, Ausstellung veranstaltet von der Universität Stuttgart, Deutsche Verlags-Anstalt, Stuttgart, 1994, p. 85



*Roof element





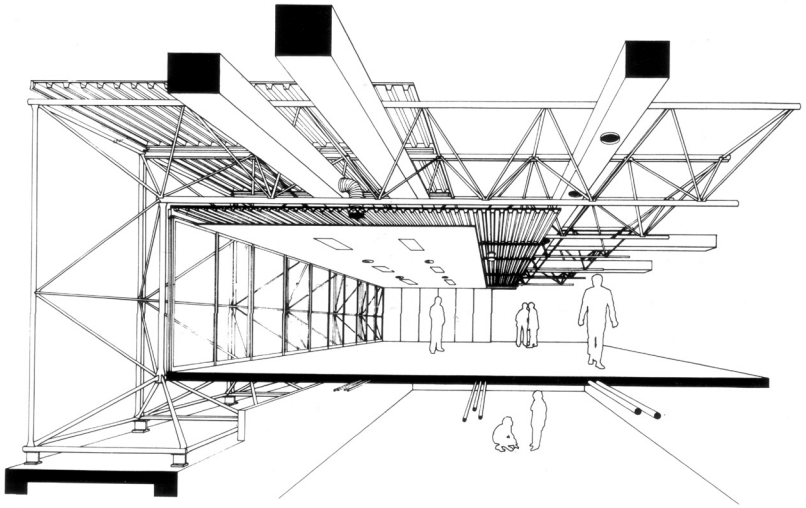


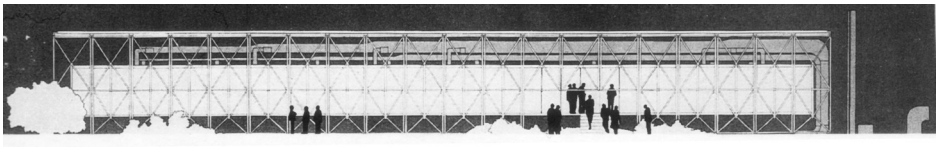
*coloum nodes
interior view
exterior view
various connections at the coloums

I | 200 | 0 10 20

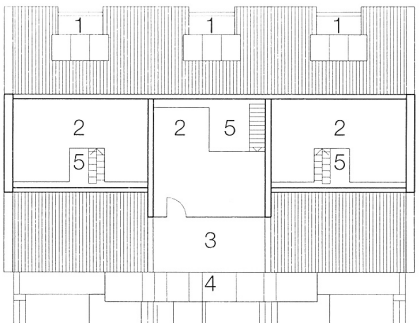
Category	Project	Author	Short description
Modular	B&B-Italia Office Building	Renzo Piano, Richard Rogers	The building houses offices of an furniture manufacturer. It has a completely free plan, with a modular structure that permits easy expansion. It can be extended ad infinitum, just by continuing to add elements. The construciton spans of 27 meters (40m long) made with extremely light self-supporting structures. Also for climatic reasons a double roof was build. The structure between the two layers of the roof also houses the service and ventilation ducts. (One of the challenges of the design was that there shouldn't be any element with a diameter larger than eight centimetres. The idea was to reduce everything to a very slender structure, to a sort of filigree: at bottom, a formal and rather sophisticated exercise, an effort of stylistic and plastic research carried out with the components of metal supporting structures.)
Site Novedrate, Como, Italy	**Year** 1971-73	**Program** Office Building	
m² 1500 m²	**Cost** no information	**useful life, intended** Permanent	**Recyclability** No recycling concept

Construction	Material	Installation	Building character	Source / Photograph Credits
Self supporting structure of frames of metal skeleton framing	Construction: Steel-framework. Facade: sandwich elements, glass Roofs: Trapezoidal sheet - one on the space (insulation) - one on the frame-structure (weather protection).	Installation outside, as objects, in the layer of the framework **Foundation** socket of reinforced concrete basement		- Buchanan, Peter: Renzo Piano Building Workshop, Sämtliche Werke, Band 1, Gerd Hatje, Stuttgart, 1994, p.45 p. 50-51 - Compagno, Andrea: Renzo Piano - Eine methodische Suche nach Kompetenz, Institut für Hochbautechnik, ETH Zürich, 1991, p.84-89





*Perspective section
Elevation



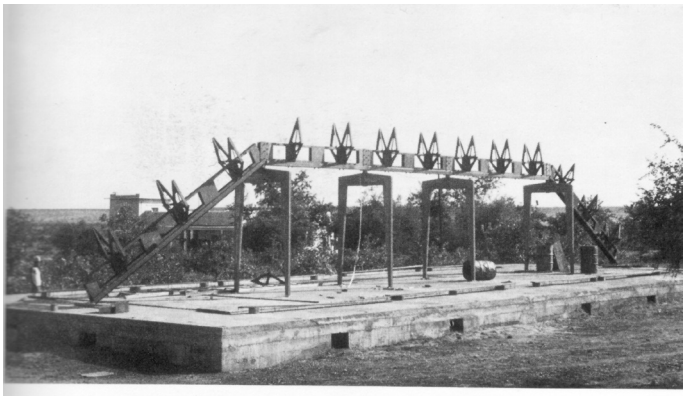
*Facade Detail
Bridge to the old office building
View

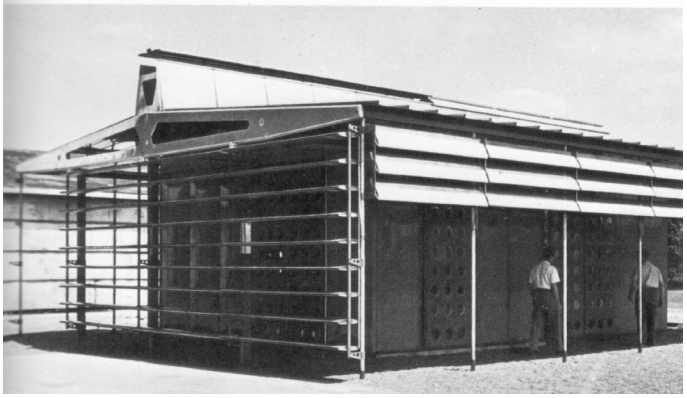
H | 200 | 0 10 20

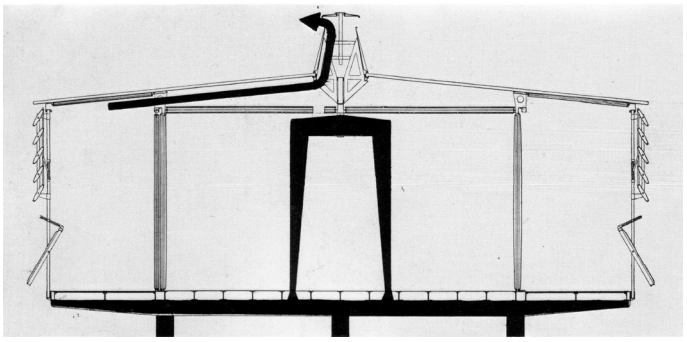
Category	Project	Author	Short description
Low Budget Modular Rapid Assembly	Tropical House	Prouvé, Jean	Variation of the Meudon houses (Metal houses) for Africa. Easy and fast assembly (one day / 4 persons) without machines and scaffolding: 1. platform put on concrete foundations 2. portal columns set up in the middle connected by a middle beam 3. roof elements fixed a the middle beam, opened and supported by wall elements. Louver facade and big roof overhang make it possible to adapt to climatic environmental requirements. The profile allowed a effective ventilation with a special ridge construction. Light construction (according to its volume) so that it can be transported easily.
Site Africa	**Year** 1949	**Program** Housing	
m² 64 m²	**Cost**	**useful life, intended** Permanent	**Recyclability** No recycling concept
Construction Steel framework. Portal coloumns connected by a middle beam. Roof elements lay on the middle beam and on the wall elements.	**Material** Aluminium panels, steel construction	**Installation** **Foundation** Platform on conrete foundings	**Building character**

Source / Photograph Credits

- Prouvé, J. (1971): Une architecture par l'industrie. Architektur aus der Fabrik. Industrial Architecture. Ed. d'Architecture Artemis/Zürich. 212 S.
- Ludwig, Matthias (1998): Mobile Architektur. Geschichte und Entwicklung transportabler und modularer Bauten. Deutsche Verlags-Anstalt/Stuttgart. S. 46-50







*Assembly
View
Cross section

P | 200 | 0 10 20

Category
Modular
Reusable

Project
Ora Town Hall

Author
Riken Yamamoto

Short description
This complex of buildings is located within a public park and combines government offices with a public town hall.

The building will be constructed of a steel structure referred to as ORA units. These are grid frames of 50 mm-square section pipes based on a 750 mm module. The wall units and beam units are connected by being bound together with metal belts. On either side of the ORA units, glass sheets, opaque panels, light fittings and open grills will be installed in accordance with the character of each space.

Site
Ora, Japan
Gunma Prefecture

Year
2005

Program
urban project,
government offices and a public town hall

m²
9800

Cost

useful life, intended
permanent

Recyclability
No recycling concept

Construction
steel grid frames of 50 mm-square section pipes based on a 750 mm module. Bound together by metal belts.

Material
- glass sheets, opaque panels, light fittings and open grills will be installed.
- steel grid frames

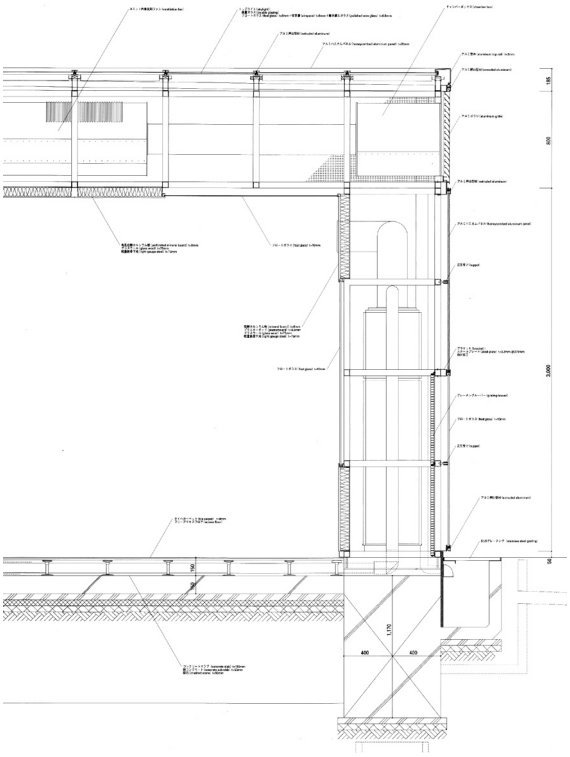
Installation
rainwater pipes, air-condition machinery and light equipment will be bound to the ORA units with belts and supported by metal components.

Foundation
Foundation slab necessary

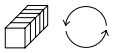
Building character

Source / Photograph Credits
- JA no.51, 2003, p. 6-19

*View



*Detail
view



Category
Modular
Recycling

Project
Paper Structure

Author
Shigeru Ban
Happold + Terrell Rooke (structure)

Short description
The paper tube structure will be covered with corrugated polycarbonate panels, but otherwise the structure ist completely open.

Site
Puilly-en Auxois, France

Year
2002

Program
Structure for boathouse

m²
Variable

Cost
depends on size of the structure

useful life, intended
> 5 years

Recyclability
Material recycling

Construction
Paper tube structure
in a six-legged spider shape with steel joints.

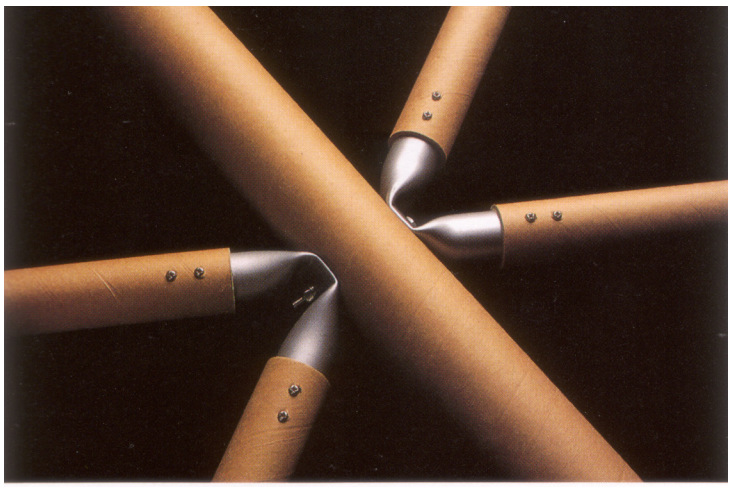
Material
Paper tube
Steel

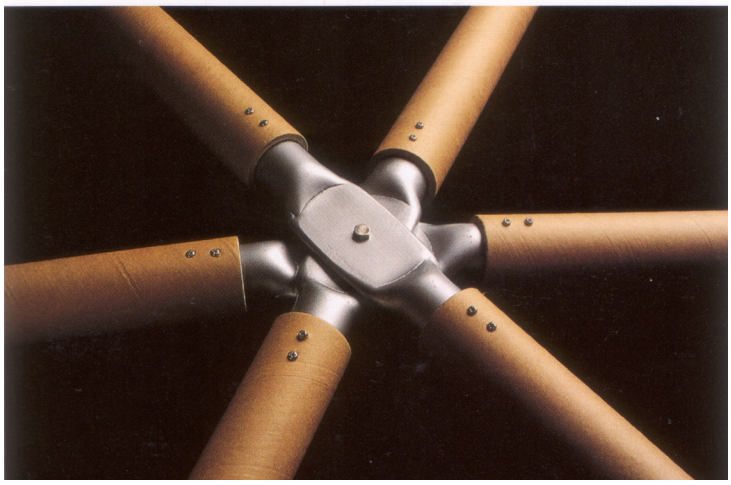
Installation
No installation

Foundation
Anchorage necessary

Building character

Source / Photograph Credits
- Shigeru Ban, Projects in Process to Japanese Pavilion, Expo 2000 Hannover, Gallery MA, Tokyo, 2000. p.41 ff
- Ban, S.: Aedes, Galerie für Architektur und Raum (2001): Shigeru Ban, recent projects. [/ [Hrsg.: Kristin Feireiss ...]. Berlin, p. 24ff
- Mc Quaid, Matilda: Shigeru Ban, Phaidon, London, New York, 2003, p. 72f



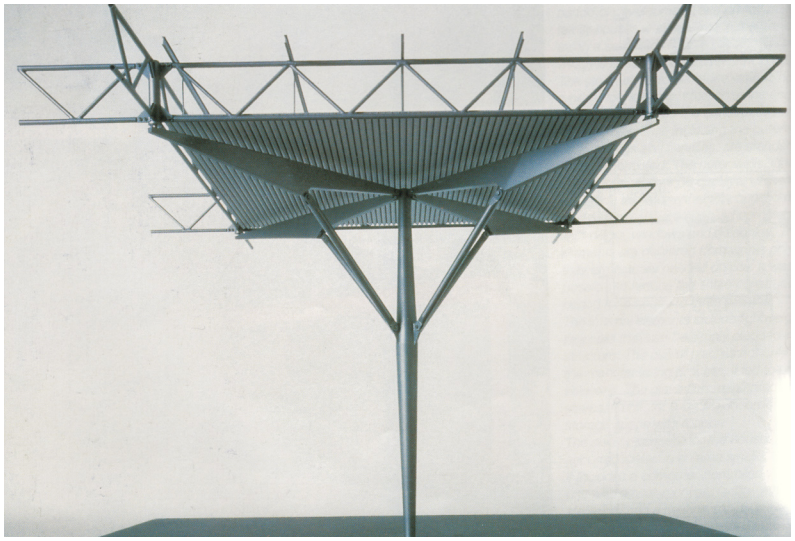


*Detail

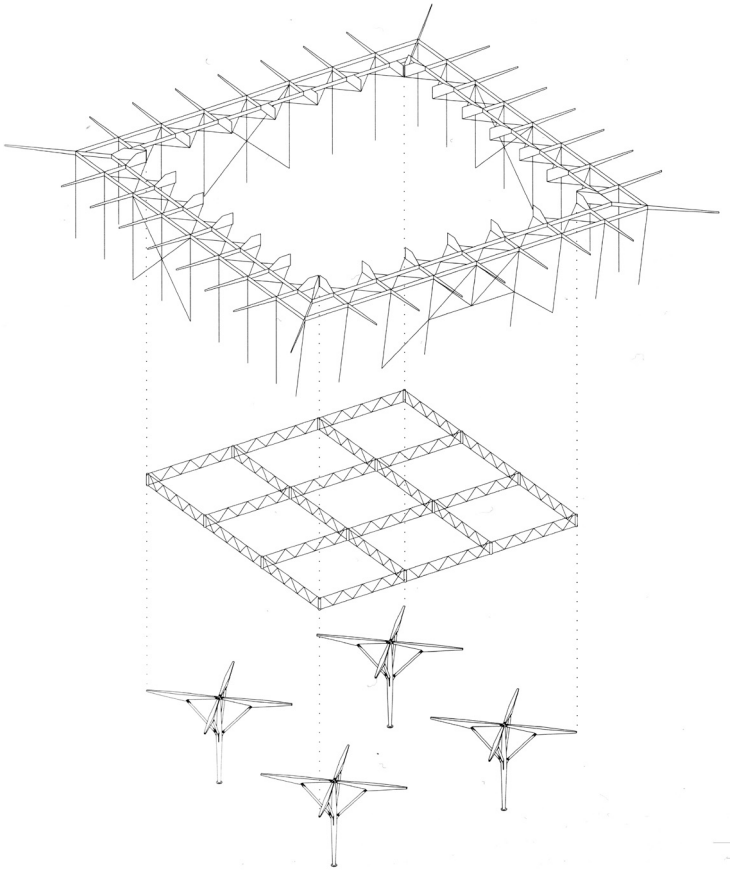
I | 50 | 0 10 20

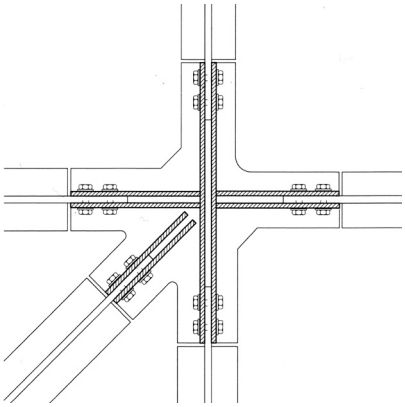
Category	Project	Author	Short description
Modular	Modular Load-Bearing Construction	Barthel & Maus (München, Germany)	A System for cooporate architecture for car showrooms. Modular system, that can be extended in any direction. It comprises a 7x7m grid of lattice girders supported by columns at 14x14 centers. The special shape of the column and the arms (tapered form) as well as the use of hollow steel section shall give the construction a coorporate design.
Site Europe	**Year** 2001	**Program** Roof structure for car showroom	
m² one module: 49 (7x7 m)	**Cost** No information	**useful life, intended** permanent	**Recyclability** no recycling concept
Construction grid of lattice girders supported by columns (14x14m grid). Individual canopy with central column with 4 diagonal arms, supported by raking struss.	**Material** steel	**Installation** - **Foundation** Concrete plate	**Building character**

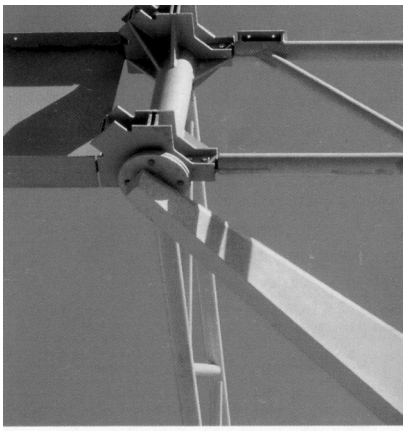
Source / Photograph Credits
- Detail 2001, 4, p. 630 f



*Model of one element
interior view







*Axonometric of system
Corner node element - Details

3 Autorenarchitektur

Category
Reusable
Small impact on landscape

Project
Loftcube

Author
Werner Aissliner, Studio Aisslinger

Short description
Loftcube is a temporary minimal living unit for city nomads which spend only a short time in one city. The building can be transported (in one piece) by helicopter to the site. The modular panels make an individual interior layout possible.

Site
Universal Entertainment GmbH,
Stralauer Allee 1, 10245 Berlin

Year
2003

Program
Housing

m²
42

Cost
1527 € / m²

useful life, intended
Single use: < 1 year
Total life span: > 10 years

Recyclability
No recycling concept

Construction
Wood framework

Material
Construction: wood modules with plastic cladding (white polystyrene)
Facade frame: bankirai wood

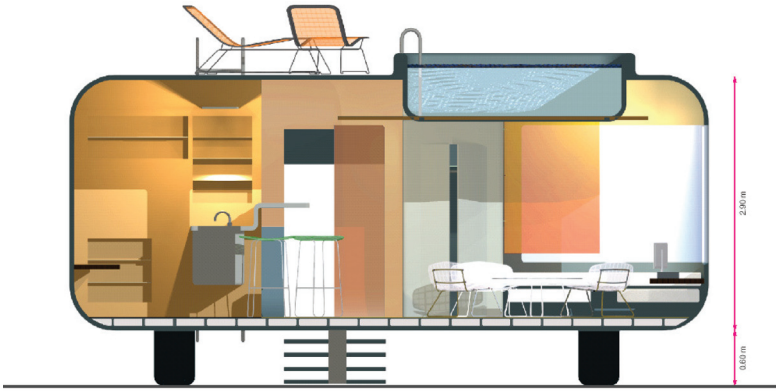
Installation
GWP installed

Foundation
Depends on soil condition

Building character
- -

Source / Photograph Credits
- "press cd, loftcube project", Studio Aisslinger, Oranienplatz 4, 10999 Berlin
- www.aisslinger.de > details

*View



*Section
Plan

I | 200 | 0 10 20

Category
Low budget
Modular
Reusable
Small impact on landscape

Project
temporary Bank

Author
aml architekturwerkstatt
Matthias Loebermann

Short description
Flexible, low-cost and temporary structure. Modular system that consits of a basic unit (3x9m, room hight 2,50 m). 3 modules are combined her to create a single structure (9x9m). For the use of a pavilion only one module is used.
All elements are timber frame construction with insulation. To reduce the span of the roof, a row of columns is inserted at the middle. Room heigh windows can be installed in every module, with pivoting luvres to provide sunshading.

Site
Nürnberg, Germany

Year
2000

Program
Bank

m²
81 m²
(one module: 27 m²)

Cost

useful life, intended
1-5 years

Recyclability
Reusable

Construction
Timber frame construction

Material
Timber, insulation

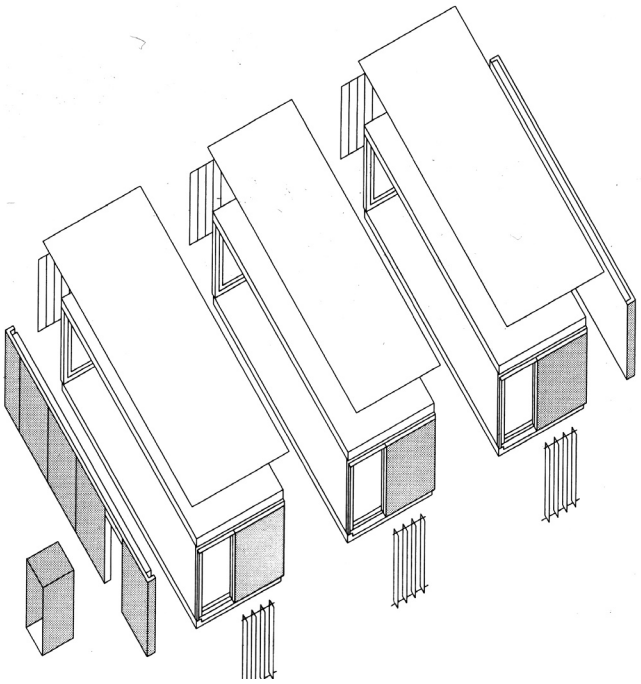
Installation
-

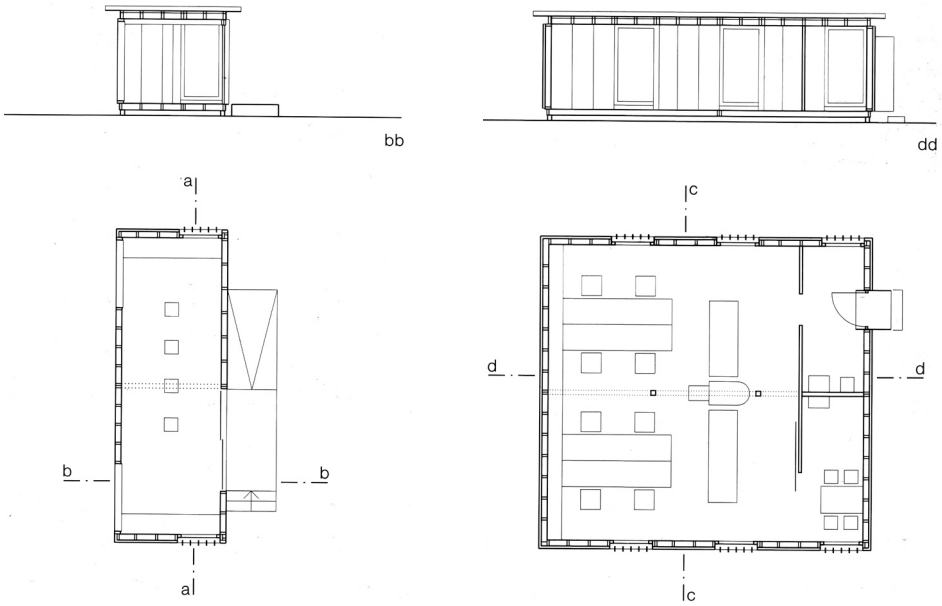
Foundation
Supporting base, consisting of three beams. Due to the dead load no other anchorage ist needed.

Building character

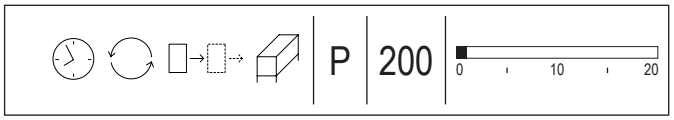
Source / Photograph Credits
- Detail 2001, 4, p. 638 f

*Views





* Axonometric view
Sections - Plan of two modules



Category
Recycling
Rapid Assembly
Reusable
Small impact on landscape

Project
paraSITE

Author
Attila Foundation
(Kas Oosterhuis, Menno Rubbens, Ilona Lénárd)

Short description
Inflatable intelligent sculpture, 4,5m tall, 6m wide, 21m deep, that can be set down anywhere. The interior is conceived as a web lounge. It is a real time behavour. Every half hour it lights up brightly in a slow-motion flash accompanied by sound (music and spoken word). Visitors can enter the silver tent through a narrow slit.

Site
Europe
1st use: R96 media event, Rotterdam, Netherlands

Year
1996

Program
weblounge, information pavilion

m²
25

Cost

useful life, intended
Single use: 1 day
Total lifespan: several years

Recyclability
Material recycling

Construction
Inflatable membrane

Material
Membrane

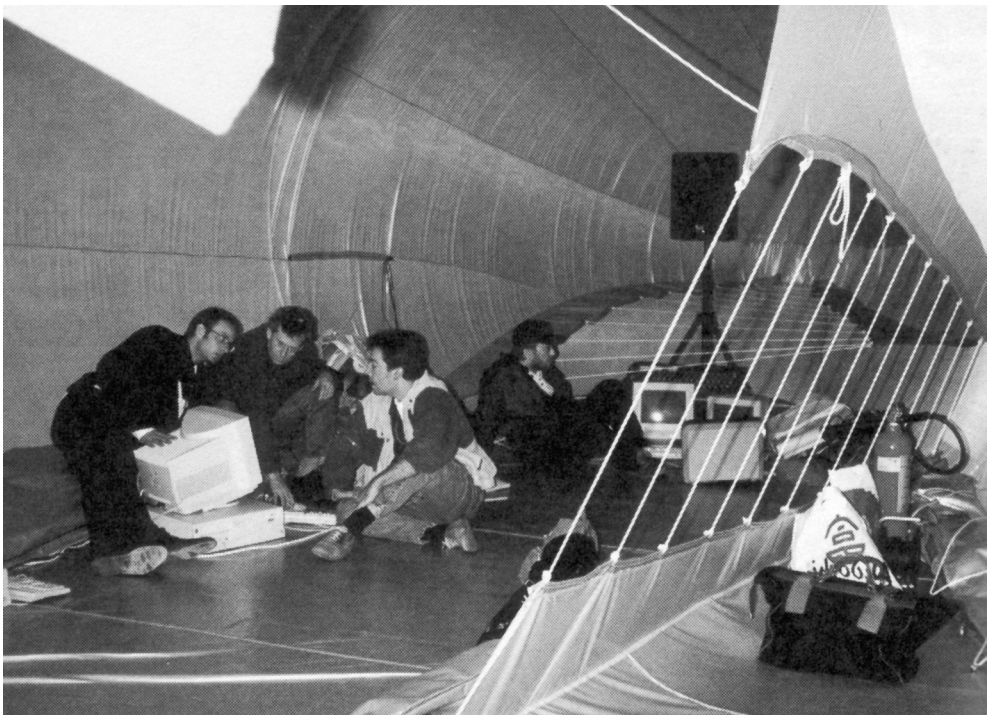
Installation
-

Foundation
put on the floor, no surface sealing

Building character

Source / Photograph Credits
- Melis, Liesbeth (Ed.): Parasite Paradise A Manifest for temporary architecture and flexible urbanism, NAI Publishers, /SKOR, Rotterdam, 2003, p. 95 ff

*View



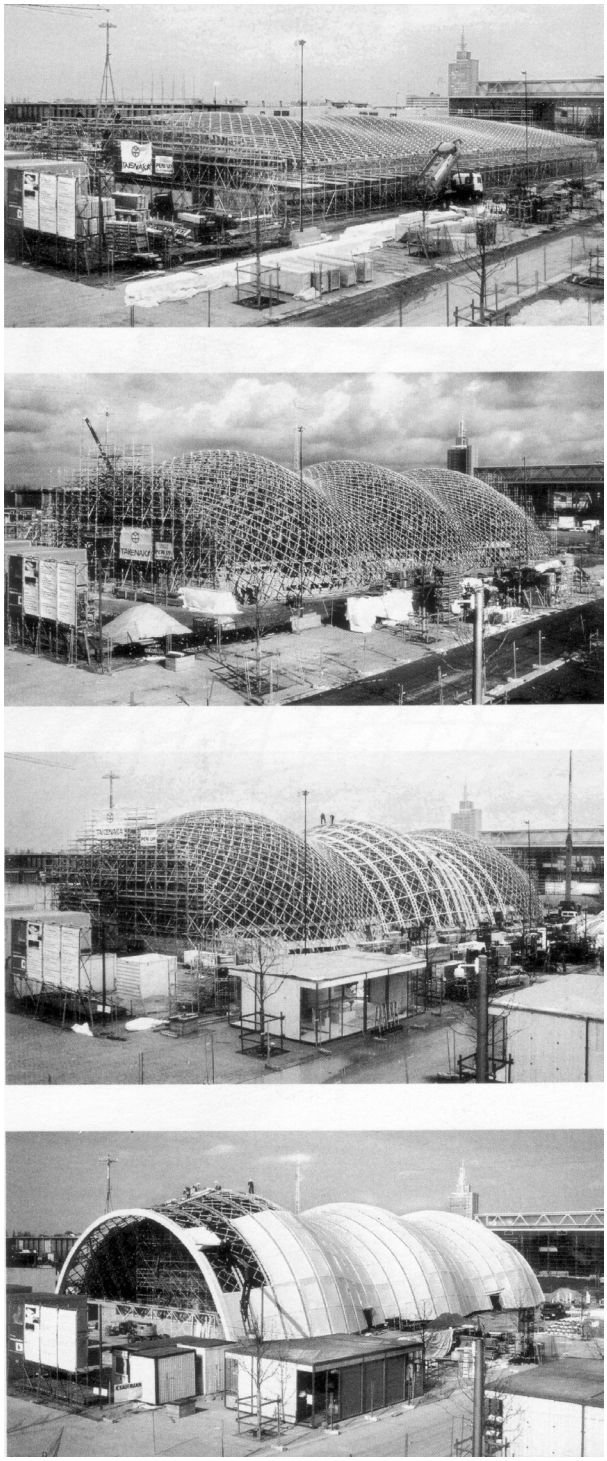
* Interior view

E | 200 | 0 10 20

Category	Project	Author	Short description
Recycling	Japanese Expo Pavilion Expo 2000	Shigeru Ban	The roof (72m by 35 m with a max. hight: 15,5 m) is covered by a specially developed waterproof and fireproof translucent paper which is reinforced by being bonded to an inner transparent pvc membrane. The ends of the dome are closed with the same material, carried on diagonal grids of carboard. Besides the dome the offices are situated in standard transport containers. A ramp is leading one storey up from where one is able to perceive the big volume of the pavilion. The dome was intended to be a completly sustainable architecture with little industrial waste. (Biggest paper structure ever built)
Site Hannover, Germany	**Year** 2000	**Program** Exhibition pavilion	
m² 3090 m²	**Cost** no information	**useful life, intended** 5 months	**Recyclability** Material Recycling
Construction Paper and wood framework, cardborad tube grid with rope-tied joints, stiffend by ladder-like arched trusses stayed by cables	**Material** Structure: cardboard tubes, rope, cables / stiffening: timber Roof skin: paper, pvc membrane Offices: containers	**Installation** Standart installation **Foundation** Steel boxes, filled with sand	**Building character**

Source / Photograph Credits
- Arch. Rev., 2000, 1243, Sept, p. 50-53
- DB 2000, 09, p.88-103
- Mc Quaid, Matilda: Shigeru Ban, Phaidon, London, New York, 2003, p. 60 ff

*Interior view



*Construction site, erection

H | 200 | 0 10 20

Category
Low Budget
Rapid Assembly
Recycling
Small impact on landscape

Project
Paper Log House

Author
Shigeru Ban

Short description
Temporary log house of paper tubes made for victims of the Earthquake in Kobe 1995. Cheap structure that could be built by anyone and quickly assembled. A hut for four persons can be erected within six hours.
At the Minamikomae Park in Kobe more than 20 units had been built. Not only did the log houses compare favourably with other types of temporary housing in terms of cost and ease and speed of construction but they were easy to recycle after use and easy to store. This prototype has since been used in a number of countries.
Walls and floor and loadbearing roof structure constist of cardboard tubes. Floor tubes between two layers of laminated wood boards. Tubes are notched. Layer of waterproof sponge set between the tubes so that the air can change.

Site
Kobe, Japan

Year
1995

Program
Housing for emergency use

m²
16

Cost
160 € / m²

2500 € for one house

useful life, intended
< 5 years

Recyclability
Material Recycling.
All parts recyclable.

Construction
Paper Tube Structure

Material
Cardboard tubes (11cm, 0,4cm thick), beer crated
laminated wood boards
canvas
sponge, PVC tent membrane for ceiling and roof

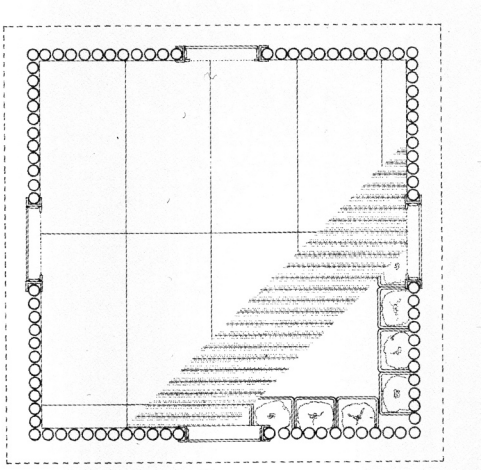
Installation
-

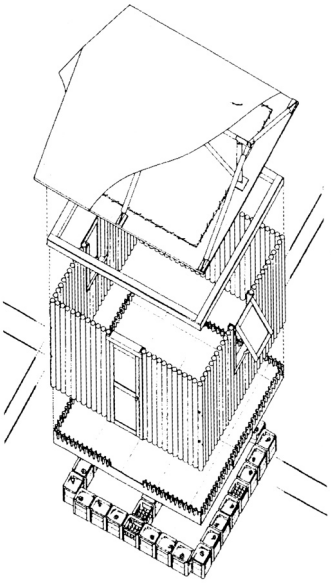
Foundation
Beer crates, filled with sand, put on the ground.
No surface sealing.

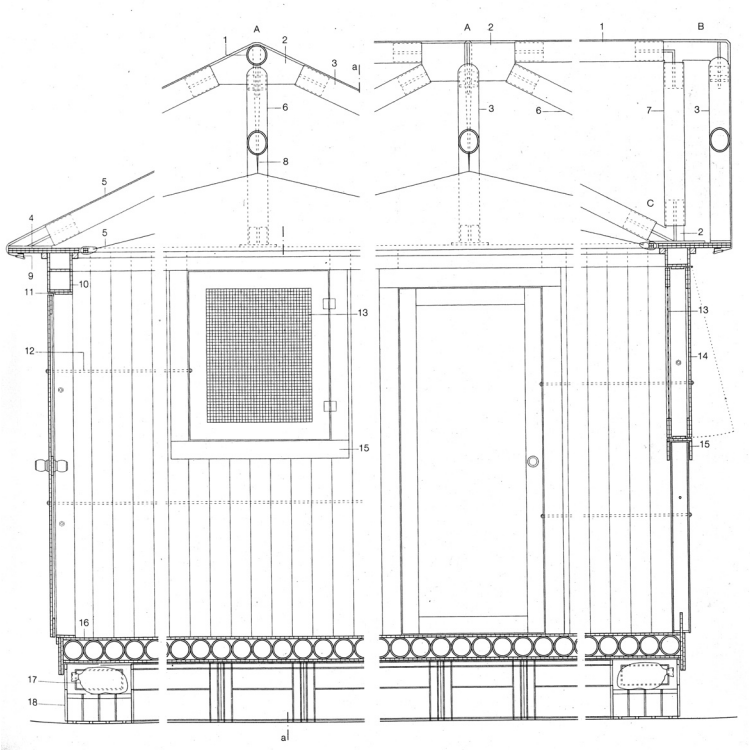
Building character

Source / Photograph Credits
- Lotus international 105, 2000, p.86-87
- Detail 1996, 8, p. 1236 ff
- Mc Quaid, Matilda: Shigeru Ban, Phaidon, London, New York, 2003, p. 34 ff

*View







*Plan
Axonometric exploded diagram
Elevation and roof details

P | 200 | 0 10 20

Category
Low Budget
Modular
Recycling, Resuable

Project
Nomadic Museum

Author
Shigeru Ban

Short description
Temporary museum. Space composed by shipping containers and membrane roof (easy building, disassemble and transport). Exhibition space was built with an individual paper tube grid-shell structure with transparent membrane.

Site
New York, USA

Year
2005

Program
Temporary Museum

m²
13.500 m²

Cost
259 € / m²

(total: 3.5 mio €)

useful life, intended
3 months

Recyclability
Product Recycling (Shutters)
Material Recycling (Paper Tubes)
Container reusable

Construction
Paper Tube Structure
Steel Structure
Shipping Container

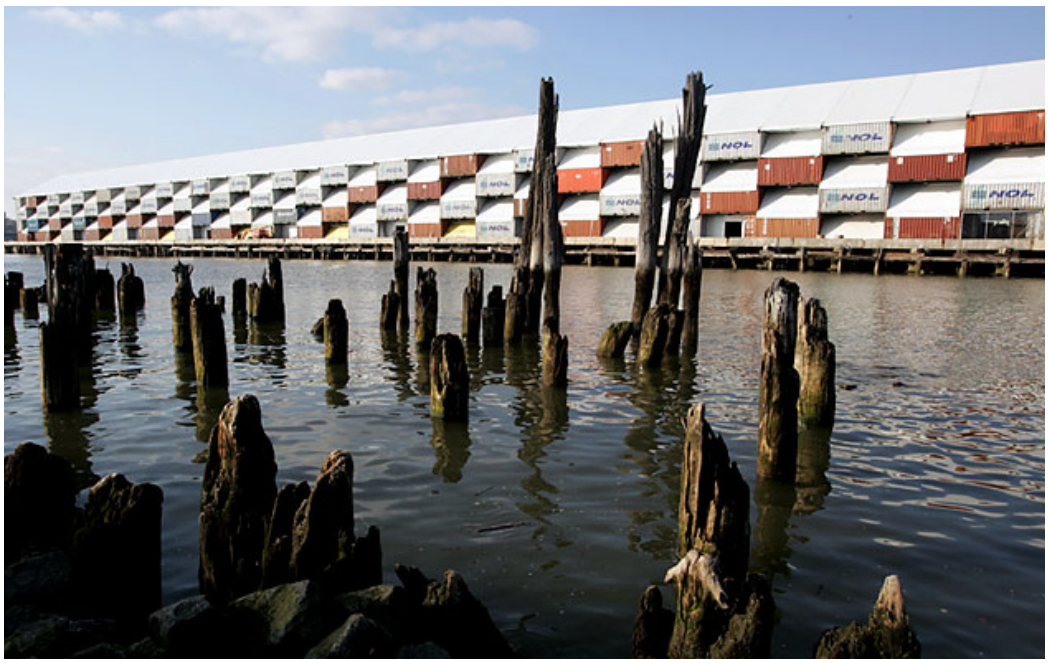
Material
construction (Paper Tubes, steel)
container (metal)
membrane (plastic coated)

Installation

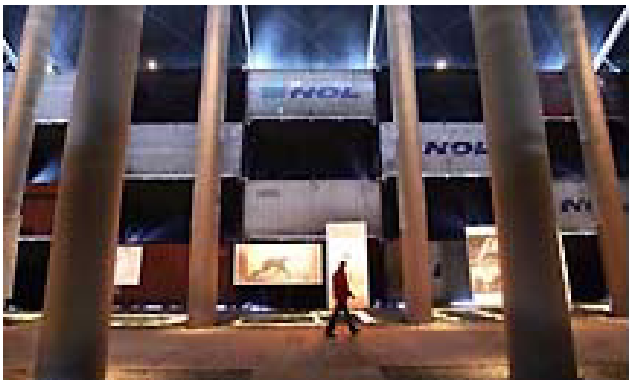
Foundation
foundation necessary

Building character

Source / Photograph Credits
- Ban, S.: Aedes, Galerie für Architektur und Raum (2001): Shigeru Ban, recent projects. [Ausstellung Aedes East Forum, 12. August - 16. September 2001] / [Hrsg.: Kristin Feireiss ...]. Berlin, p. 12ff



* View



* Interior View
View

H 200 0 10 20

Category
Recycling
Small impact on landscape

Project
Jukkasjärvi Ice Hotel

Author
Yngve Bergquist, Ake Larsson, Kako Nordström

Short description
The Jukkasjärvi Ice Hotel is a complex of 4000 m2 snow buildings which are erected yearly. Inside the hotel the temperature stays at -5 C, uneffected by the visitors.

The structure is based on molding principles: Artifical snow is shot on to steel moulds to shape vaults. The snow sets for 2-3 days before the mould is moved to the next place to repeat the process - creating in the end a tunnel space. To prevent the vaults from sagging, ice columns drilled in segments out of the Torne River ice are stacked in the middle of the space.

Ice architecture is event-architecture, where, in reality, time or no-time, becomes the building material itself. The most important quality that transforms snow architecture into an event is the knowledge of its ultimate dissolution.

Site
Jukkasjärvi, Sweden

Year
1997

Program
Hotel

m²
4000

Cost
69 € / m²

(total 276 000 €)

useful life, intended
1 winter season

Recyclability
Recycling: Ice and snow melts every spring

Construction
Snow
Ice columns

Material
Snow, ice

Installation

Foundation
No foundation necessary

Building character

Source / Photograph Credits
- “Ephemeral / Portable Architecture”, AD Architechtural Design, 1998, p.16-21

*View
Interior view

Category
Rapid assembly
Reusable
Small impact on landscape

Project
Extendible Caravan with Tent Roofs
Markies

Author
Eduard Böhtlingk

Short description
Caravan that provides extension by allowing the side walls to be folded down. Core (2,2 x 4,5m) includes kitchen, dining space, bathroom and WC can thus be enlarged to the size of a small house (4,5 x 6,6 m)
The extension areas are covered with folding tent roofs (can also be opened). Floor flaps and roofs are operated by electric motors.
Furniture can be foldet up in part to achieve flexibility.

Site
Europe

Year
1985

Program
Housing

m²
10.30 m² (core)
30 m² (extended)

Cost

useful life, intended
single use: < 1 day
total lifespan: permanent

Recyclability
no recycling concept

Construction
Caravan. Sandwich panels

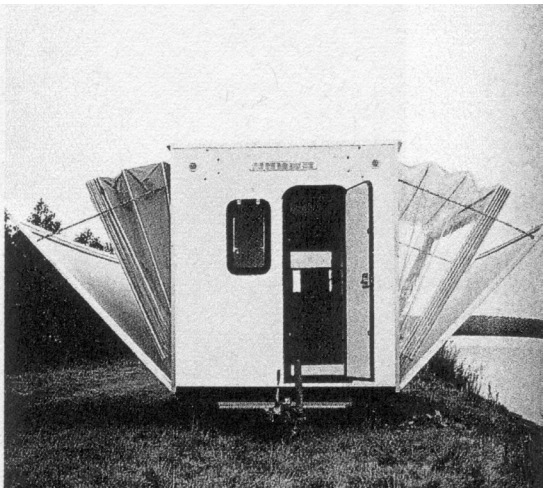
Material
Bodywork: 30mm coated polyester coated sandwich panels reinforced at the edges with steel.
Furniture: multiplex sheets with vinyl or synthetic-resin coating.

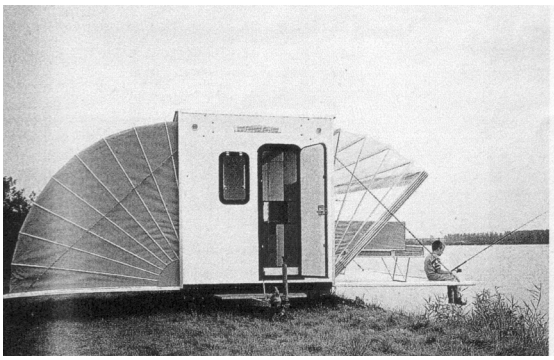
Installation
plug-in caravan installation

Foundation
stands on wheels

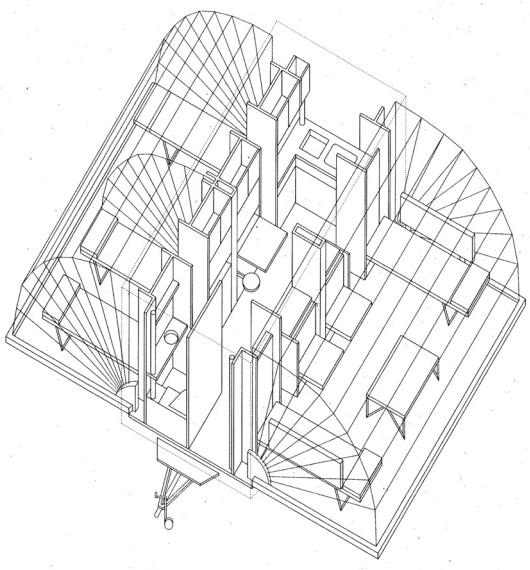
Building character

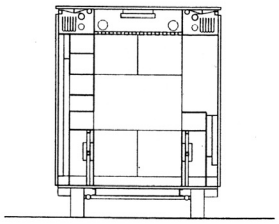
Source / Photograph Credits
- Bauwelt 6-7, 2000, p. 34 ff
- www.bohtlingk.nl



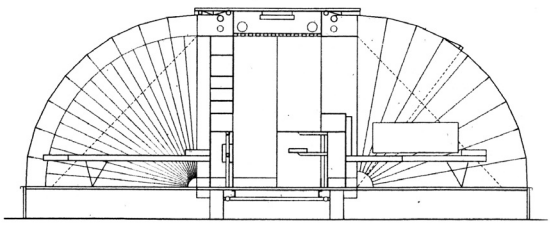


*Views - unfolding stages

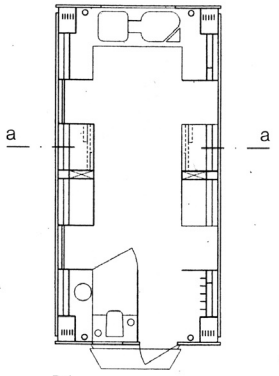




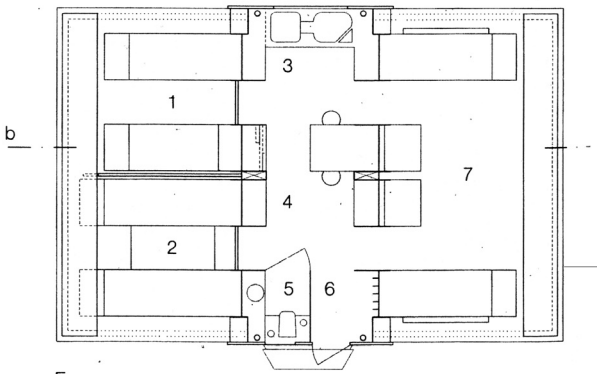
B



C



D

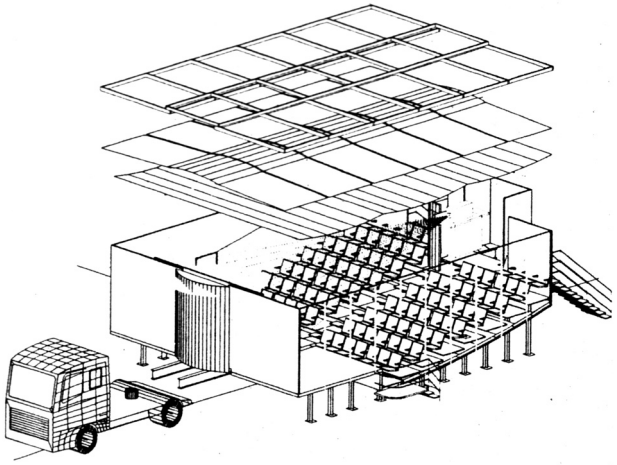


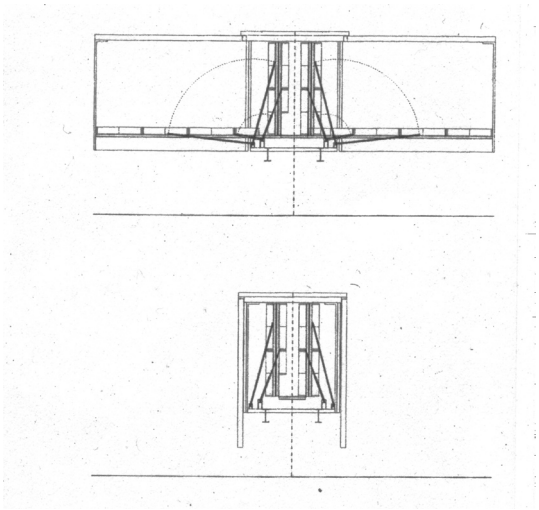
E

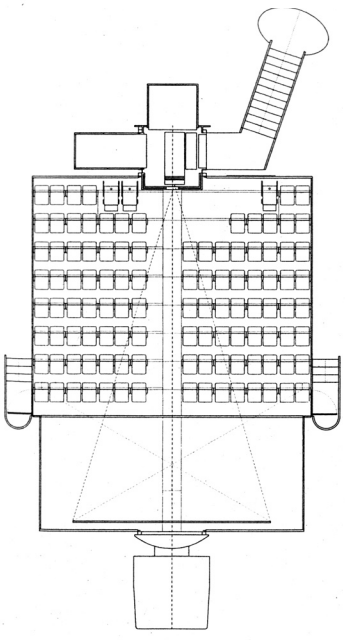
*Axonometric view
Section - Plan

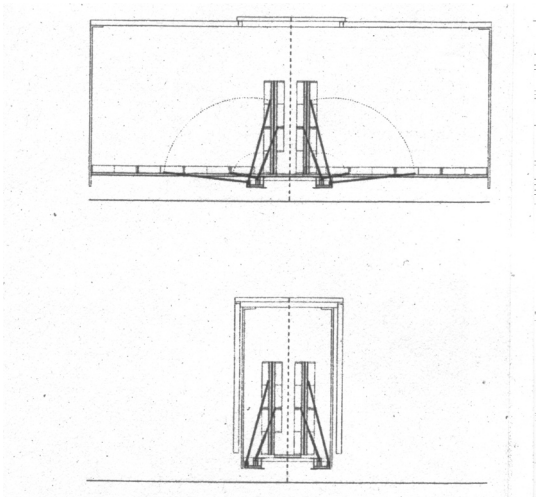
P | 200 | 0 10 20

Category	Project	Author	Short description
Reusable Small impact on landscape	Mobile cinema (Project)	Circus Architects, London	Truck trailer that can be opened and enlarged to a cinema. The 13,6m trailer is equipped with projection- and soundsystem, internet and satelliteconnection, aircondition and wheelchair access and has 110 standard cinema seats. Assembly: opening of the sidewalls to the top (forms another roof). Sidewalls can be shifted out. Panels that can be opend to the bottem form the floor, laid on adjustable columns. Counter, stairs, seats and screen will be assembed at last.
Site Scotland, UK	**Year** 1996	**Program** Cinema	
m² 16 m² (folded)	**Cost** no information	**useful life, intended** Single use: 1 day Total lifespan: permanent	**Recyclability** Reusable
Construction Truck trailer	**Material** Panels, metal, plastic	**Installation** Power engine, climatic control **Foundation** truck trailer on wheels, extension on adjustable columns, no surface sealing	**Building character**	**Source / Photograph Credits** - Detail 1996, 8, p. 1206









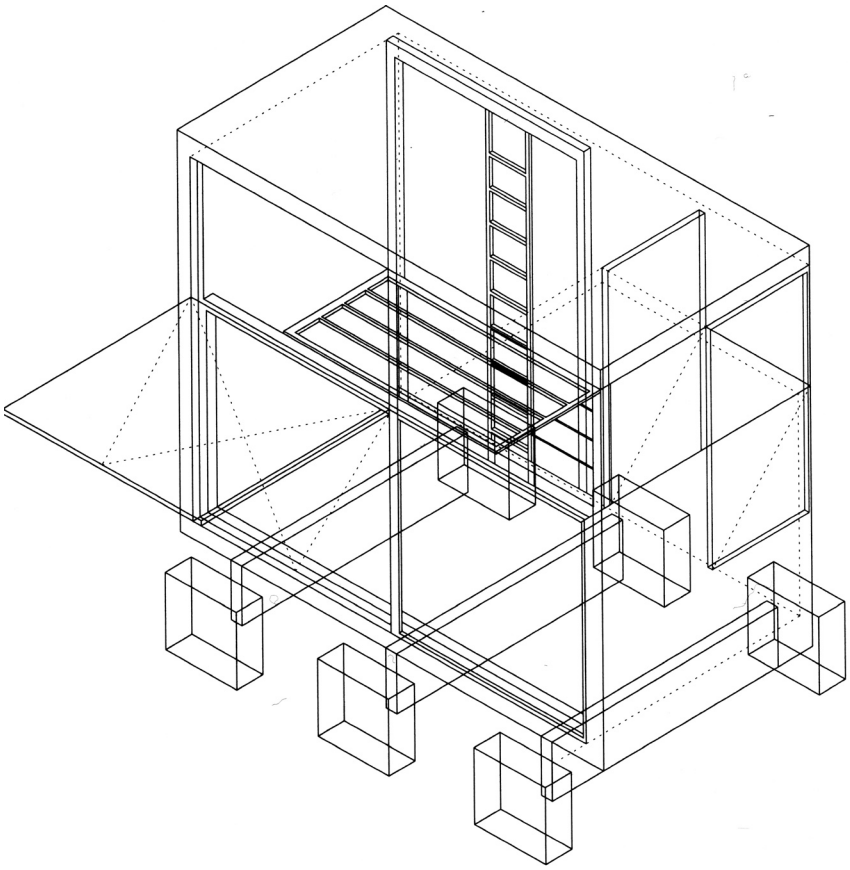
*Axonometric view - section in non-lifted state
Plan - section in lifted state

H | 200 | 0 10 20

Category	Project	Author	Short description
Reusable Small impact on landscape	Multifunctional Extra Room	Exilhäuser (Pfaffing, Germany)	Multifunctional small building, 4x2 m, divided in three rooms: atelier with sleeping niveau above and a hall. Wood construction, pre-fabricated, various facade element possible. Inside a wooden shell that covers the installation, equipped with foldable furniture. Isolation possible. By neon-lights different light moods can be created. (The box becomes a architectural object at night.) As temporary and flexible movable container the building needs no building licence.
Site Pfaffing, Germany	**Year** 2001	**Program** mulifunctinal additional room (housing, atelier...)	
m² 8	**Cost** 4375 € / m²	**useful life, intended** Single use: < 1 year Total life span: permanent	**Recyclability** Reusable
Construction Timber construction	**Material** Timber, plexiglas	**Installation** **Foundation** Laid on a sealed surface in the city	**Building character**

Source / Photograph Credits
- DBZ 5/2001 p. 72

*View



*Axonometric Projection

E | 200 | 0 10 20

Category
Reusable
Small impact on landscape

Project
Airtecture

Author
Festo Corporate Design Group
(Rosemarie Wagner, Axel Thallemer, Udo Rutsche)

Short description
The pneumatic exhibition building that was developed by Festo reacts to environmental influences like a living organism. Air chambers that are inflated with high pressure and intelligently arranged, form a building.
330 single air-inflated chambers and a computer create a self-controlled system which checks the pressure of each chamber at regular intervals and controls it in accordance with a weather station.
Various technologies and membrane materials had to be re-developed to realise Airtecture. The result is a very well-functioning building that can be folded up in a standard international 40-ft container, if necessary.

Site
Esslingen, Germany

Year
1996

Program
Exhibition

m²
375 m²

Cost
3272 € / m²

(total cost 1.227.100 €)

useful life, intended
Single use: < 5 years
Total life span: > 10 years

Recyclability
Reusable

Construction
Pneu
(330 air chambers are inflated with high pressure)

Material
Poyestermembrane
Hypalon- and Levaprencoating
Pneu muscle: Poliamid or Trevira CS membrane / Siliconecoating

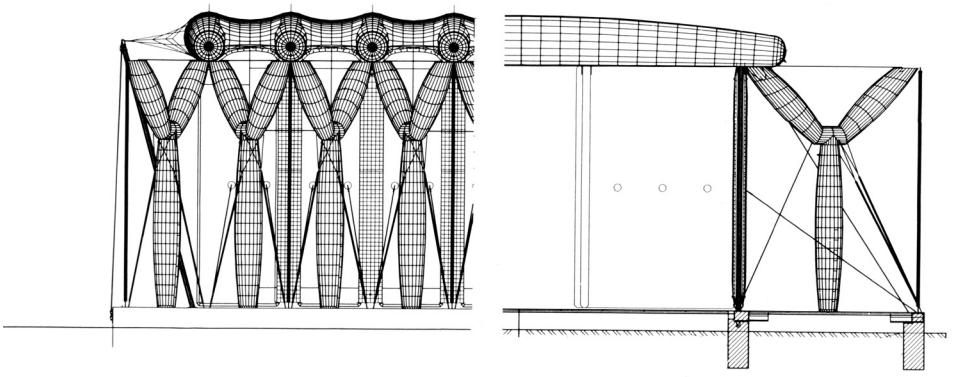
Installation
Heating and lighting system

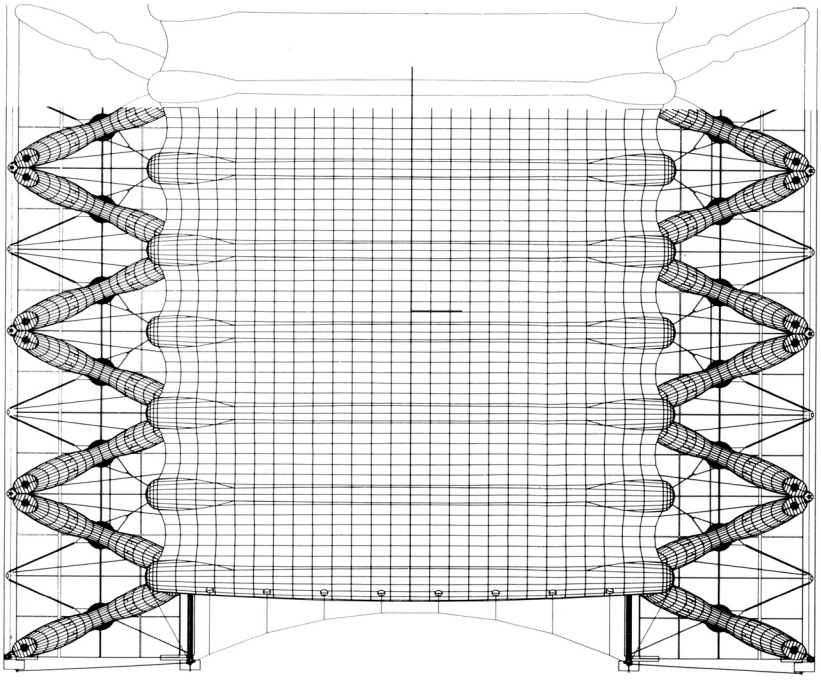
Foundation
Metal grid platform above ground

Building character

Source / Photograph Credits
- Herwig, Oliver: Featherweights, Munich, Prestel, 2003, p.96ff

*Exterior view





*Section
Plan

E | 200 | 0 10 20

Category
Reusable
Small impact on landscape

Project
Airquarium

Author
Festo Corporate Design Group
(Axel Thallemer)

Short description
„Airquarium" is a newly developed inflated air structure whose idea is borrowed from a natural phenomenon: if raindrops hit a water surface, a spherical skin of water stretches above the point of impact in the shape of a cupola.
Above the foundation it stretches a membrane cupola supported by air with a diameter of 32 meters and a height of 8 meters. The material of the membrane consists of a synthetic caoutchouc whose overall light permeability is higher than that of glass. The caoutchouc is fire resistant and – should there ever be a fire – emits a harmless mixture of steam consisting of water and vinegar.
The structure and pertaining technology can be transported in two 20-foot containers that fit onto a semitrailer truck.

Site
Esslingen, Germany

Year
2002

Program
Exhibition

m²
629

Cost

useful life, intended
Single use: < 5 years
Total life span: > 10 years

Recyclability
Reusable

Construction
Pneu
(membrane supported by air)

Material
Membrane: synthetic caoutchouc whose overall light permeability is higher than that of glass

Installation
-

Foundation
A ring filled with 120 tons of water serves as the foundation and anchorage of the mobile structure

Building character

Source / Photograph Credits
- Herwig, Oliver: Featherweights, Munich, Prestel, 2003, p.96ff
- http://www.designpreis.de/2002/designpreis11.html

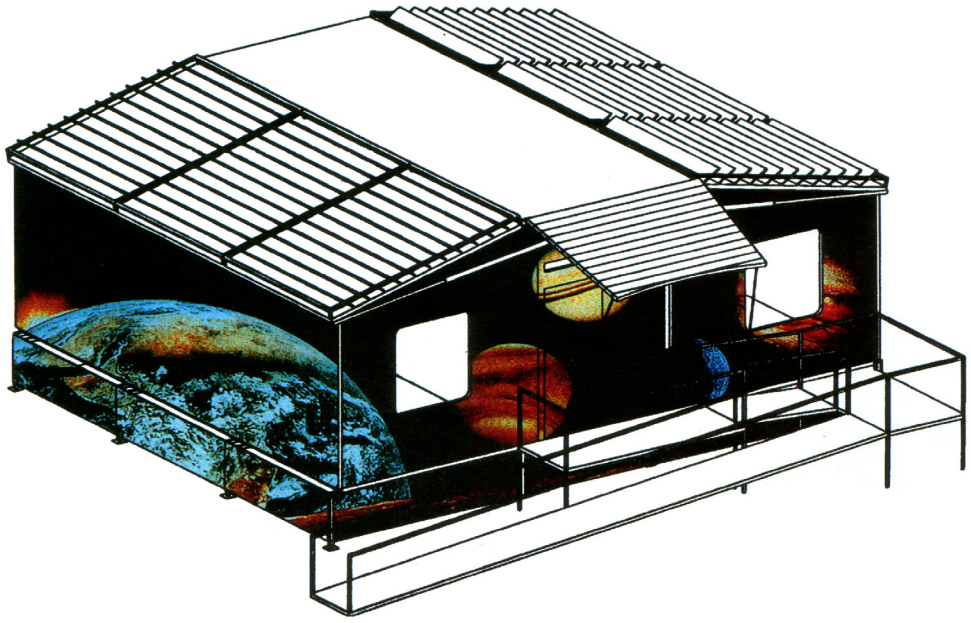
*View

*Interior view

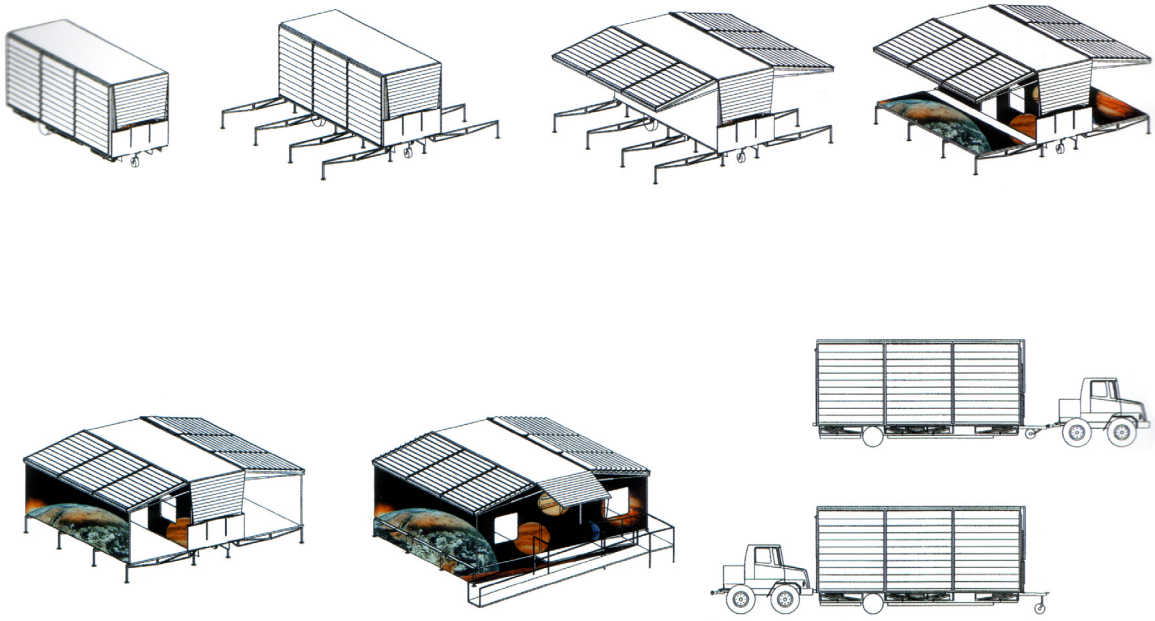
P | 200 | 0 10 20

Category	Project	Author	Short description
Reusable Small impact on landscape	Mobile Campus	FTL Happold	The New York City School Construction Authority established the requirement for temporary deployable classrooms that can augment school facilities at a specific location and move on after they are no longer needed. FTL Happold developed a mobile camus for 300 students. Over 100 schools will be served by these wheeled buildings. These facilities can also be used in stand-alone situations. The buildings are deployed from a staging area and are capable of carrying all of their own infrastructure which makes them entirely independent of public services and utility grid. The prototype design utilises a 8m long trailer with walls that unfold to create a 9x8 m classroom. The setup time is about 1 day.
Site New York City, USA	**Year** 1998	**Program** mobile campus classrooms, administration offices, library, room for art / music, science, computer work, cafeteria and gym	
m² 64,6	**Cost** ~ 1000 € / m²	**useful life, intended** Single use: several weeks Total lifespan: permanent	**Recyclability** Resuable
Construction Trailer steel construction	**Material** Trailer Luminous fabric roof Wooden wall panels	**Installation** Buildings are capable of carrying all of their own infrastructure: Power generation, heating, air conditioning, toilets, water storage, fuel storage, etc. **Foundation** No foundation needed wheeled buildings	**Building character**

Source / Photograph Credits
- "Ephemeral / Portable Architecture", AD Architechtural Design, 1998, p.80-85



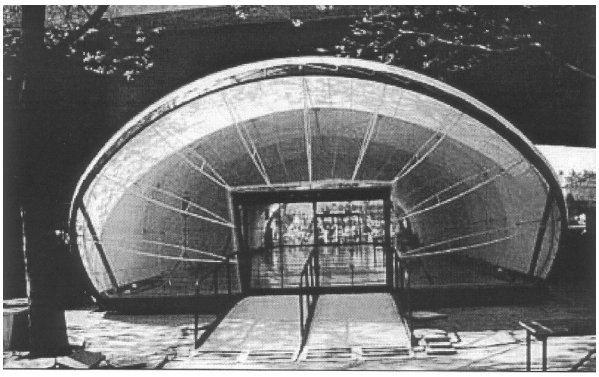
*Axonometric view

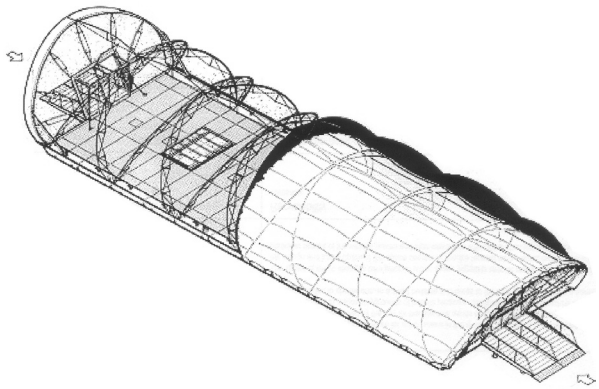


*Assembly sequence

P | 200 | 0 10 20

Category	Project	Author	Short description	
Reusable Small Impact on Landscape modular	MoMi Exhibition Tent	Future Systems	The tent is designed for the Museum of Motion Pictures in London, UK. The transluzent membrane is out of Tenera. The upper construction is an arched steel structure. The assembly / dismantling takes two days (6 persons).	
Site London, UK	Year 1991	Program Exhibition		
m² 276	Cost 1882 € / m² (total cost 519.467 €)	useful life, intended 1 year	Recyclability No recycling concept	
Construction compass roof (arched steel structure)	Material Lenera membrane (skin) steel (construction) aluminium panals (floor)	Installation Installation inside double floor construction Foundation Anchorage necessary	Building character	Source / Photograph Credits - Przybylok, Michael: Mobile & Modular, ITKE, University Stuttgart, 2003





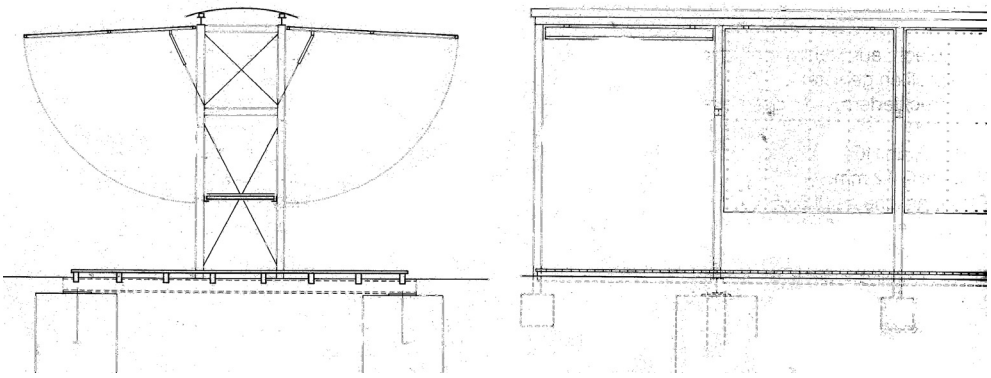
*Exterior view
Axonometric view

E | 200 | 0 10 20

Category	Project	Author	Short description
Modular Rapid Assembly Reusable	Exhibition Pavilion	Béatrice Jullien	Exhibition pavilion to show the reconstruction of a historic garden . The leigthweight construction can be assembled within a short time. Six steel frames support the presentation talbes, which consitst of a number of interchangeable modular panels. The spring operated steel flaps at the sides can be opened to provide protection against the elements.
Site Vallery, France	**Year** 1996	**Program** Exhibition pavillion	
m² 56	**Cost**	**useful life, intended** 1-5 years	**Recyclability** No recycling concept, reusable
Construction Steel frames	**Material** Steel, timber boarding	**Installation** -	**Building character**
		Foundation Single concrete foundtations for steel beams which support a wooden sole	

Source / Photograph Credits
- Detail 1996, 8, p.1212

*View



*Cross section - elevation (partially)
View

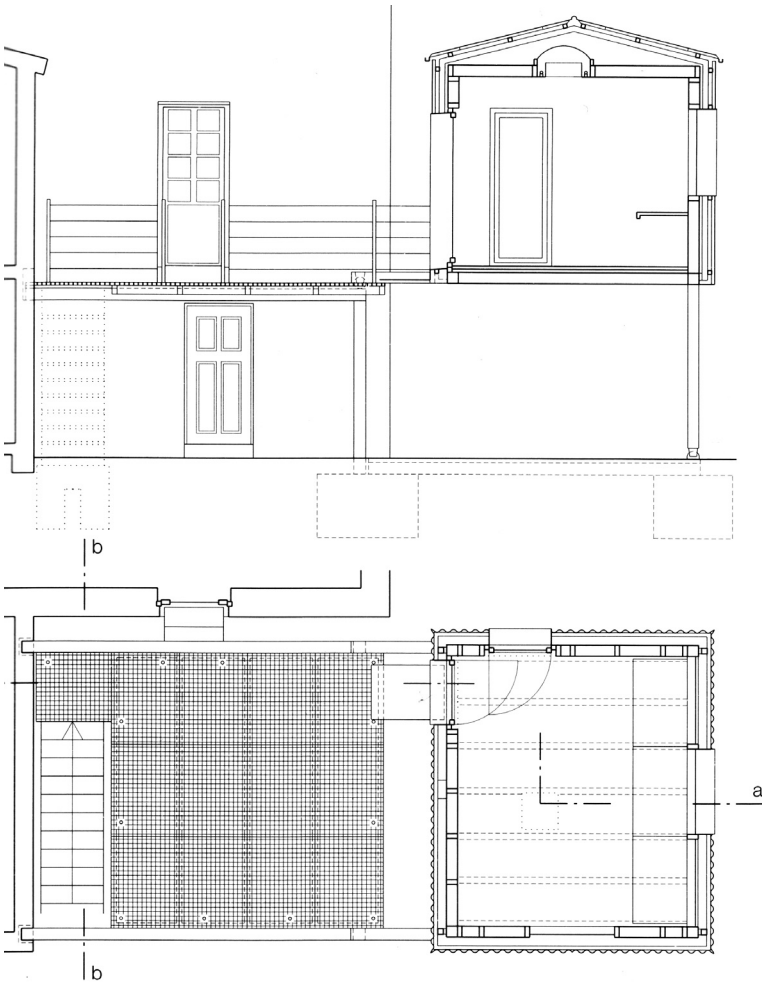
H 200

0 10 20

Category	Project	Author	Short description
Small impact on landscape	Movable Studio	Gerhard Kalhöfer, Stefan Korschildgen	Addition to a small house in the country. Flexible workspace that can be moved on two steel tracks. In the summer, the studio is seperated from the house by a terrace of steel grating; in the winter it is brought closer and is accessible directly from the house. The platform of metal grating which let light penetrate to the ground below. The railing can be quickly dismounted, faciliating a swift rollback of the extension in winter. The new annex has the same cross section than the existing extension in the 1950s. The interior panels can be removed to turn the studio into a greenhouse
Site Remscheid, Germany	**Year** 1997	**Program** Flexible workspace, Enlargement of the living area	
m² 14	**Cost**	**useful life, intended** permanent	**Recyclability** Material recycling partially possible.
Construction Raised framework of hollow steel	**Material** Outside walls: corrugated PVC Interior walls: plywood panels Platform: metal gratings	**Installation** Electrical installation visibly housed in the cavity behind the panels. Power supply plugged in from below **Foundation** Steel framework is mounted on industrial rollers in channel-section tracks	**Building character**

Source / Photograph Credits
- Lotus international 105, 2000, p. 34 ff
- Detail 1998,1, p. 28 ff
- db, 7/ 98

*Views
(winter - summer position)



*Sections
Plan (summer position)

Category
Modular
Rapid Assembly
Reusable
Small impact on landscape

Project
A&B House

Author
Oskar Leo Kaufmann & Johannes Norlander

Short description
Prefabricated small house on wheels for different programs. Multi-use dwelling, not bigger than a parking lot . It can be delivered in parts or in whole.
It can be ordered via internet with various packages (window package, shutter package, facade opening, base package, toilet/shower unit, kitchen package, electricity / heating, oven, solar cell package, painting, furniture).
(Should be not final solution but a intermediate stage to the development of a modular construction system that constists of prefabricated elements.)

Site
Europe

Year
2002

Program
Housing

m²
12,8

(5,80m x 2,20m x 3,17m)

Cost
6190 - 15000 € / m²

useful life, intended
Single use: 1 day
Total lifespan: permanent

Recyclability
Material recycling possible,
reusable

Construction
Wood construction, wood panels

Material
Floor, walls and roof:
wood panels (69mm plywood with a coat of paint)
Window and door frames: natural aluminium
Stairs an sockes: perforated metal plate

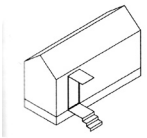
Installation
electric installation on the surface
Plug-in system

Foundation
Elevated on 6 metal feet or wheels on a concrete baseplate or on 6 provided single bases.

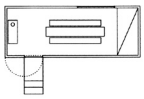
Building character

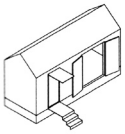
Source / Photograph Credits
- L'architecture d'aujoud'hui 341, 07/08 2002, p. 24 ff
- www.salzburg.com/sn/sonderbeilagen/artikel/409423.html#

*View

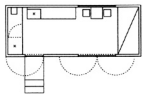


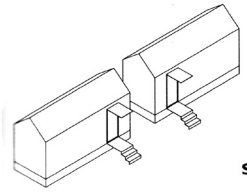
Cabane



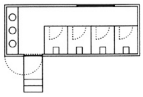


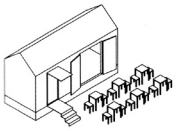
Abri de jardin



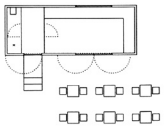


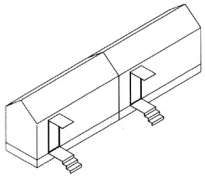
Sanitaires



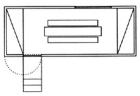


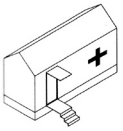
Buvette



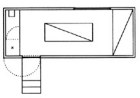


Base de campement





Unité hospitalière



*Variations for basic module

H 200 0 10 20

Category
Low budget

Project
Latapie House

Author
Anne Lacaton,
Jean Philippe Vassal

Short description
Low budget house with very flexible living space for a familiy with two children.
Fits into the street profile, simple volume. Street side: metal frame covered by opaque cement-fiber cladding.
Garden side: callding with transparent PVC.
Wooden volume wedged into the frame the opaque cladding, defines an insulated and heated winter space.
With this simple method the habitable space is doubled (can be used only in summer).
The house can so be converted from a most closed to a most open state in accordance with the need for light, tranparenct, intimacy, protection and ventilation. The habitable part of the house can be varied from the smallest (living room and bedrooms) to the largest (embracing the whole garden).

Site
Floirac, Bordeaux, France

Year
1993

Program
Housing

m²

Cost

useful life, intended
permanent

Recyclability
No recycling concept

Construction
House: metal frame
Conservatory: wooden frame

Material
House:
Facade - cement fibre cladding

Consevatory:
Facade - transparent PVC

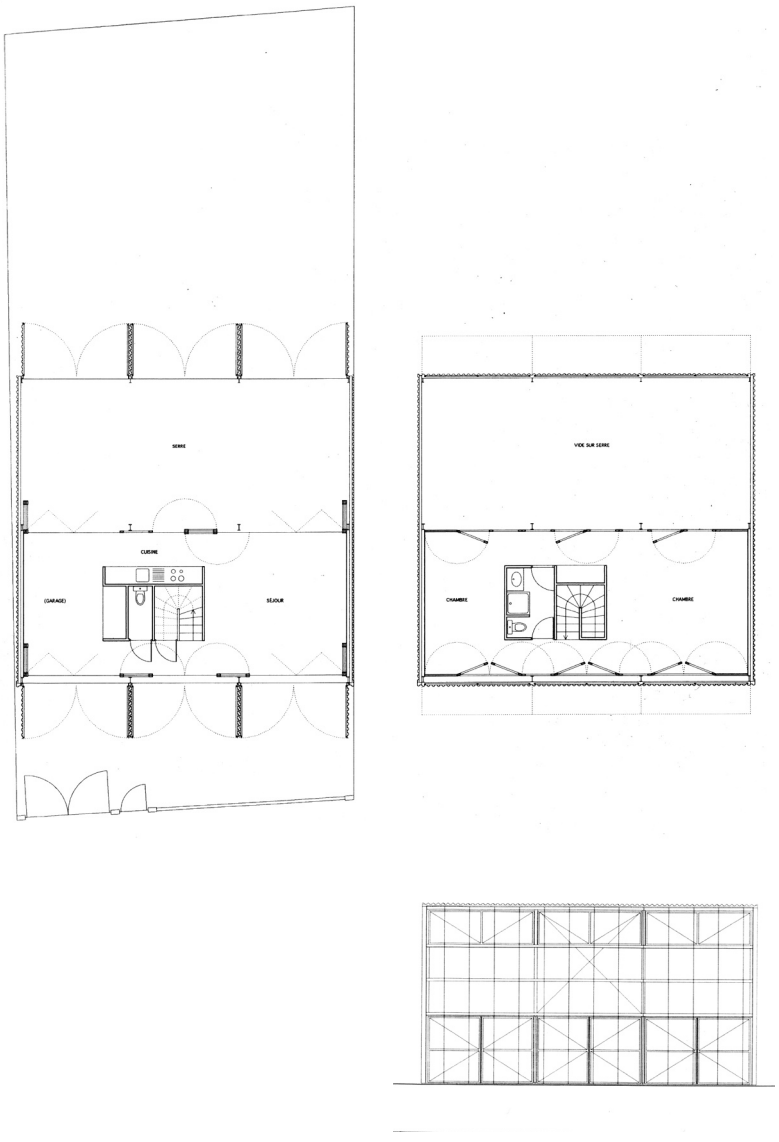
Installation
interior block with installation, including toilet, kitchen (ground floor), bathroom (1st floor) and the staircase

Foundation
Concrete sole-plate

Building character
-

Source / Photograph Credits
- Lotus international 105 / 2000

*View



*Plans (ground floor, 1st floor)
Elevation

Category
Modular
Reusable
Small impact on landscape

Project
IBM Travelling Pavilion

Author
Renzo Piano

Short description
A temporary pavilion designed to house an exhibition staged in the parks of various European cities. 48 meters long, 12 meters wide, and 6 metres high, it is made up of 44 arches. It is a transparent and immaterial pavilion, immersed in nature.

The pavilion was intentionally demolished at the end of its tour across Europe.
The exhibition message (telecommunication makes it possible to work anywhere) required a experimental building, that could also be erected in various locations.

Site
various cities in Europe

Year
1982-86

Program
Exhibition Pavilion

m²
580

Cost

useful life, intended
Single use: several weeks
Total lifespan: 5 years

Recyclability
reusable

Construction
Barrel vault, single axial. Two half-arches joined at the roof, consist of six pyramidal elements with supports of wood and metal joints.

Material
Pyramidal elements: transparent, light polycarbonate material
Sticks: laminated wood
Aluminium joints

Different material glued together by a ultra-strong adhesives.

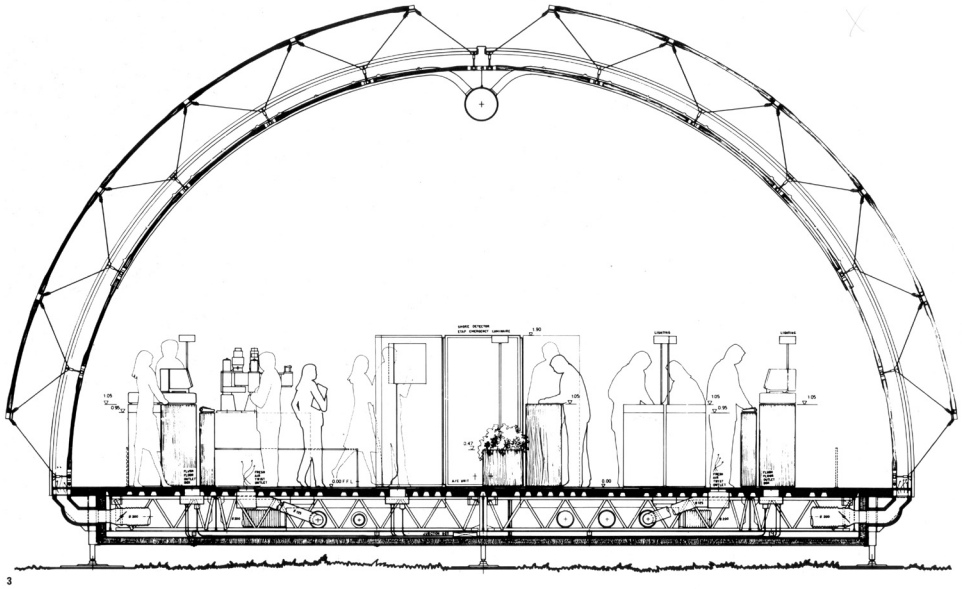
Installation
in the floor layer

Foundation
built on stilts,
small impact on the landscape

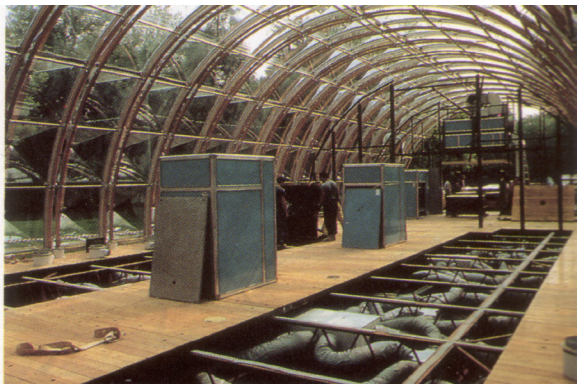
Building character

Source / Photograph Credits
- Futagawa, Yukio: Renzo Piano Building Workshop, Ga Architect 14, A.D.A. EDITA, Tokyo, 2001, p.76 ff
- Buchanan, Peter: Renzo Piano Building Workshop, Sämtliche Werke, Band 1, Gerd Hatje, Stuttgart, 1994, p.112 ff
- Compagno, Andrea: Renzo Piano - Eine methodische Suche nach Kompetenz, Institut für Hochbautechnik, ETH Zürich, 1991, p.126 ff

*View



3



*Cross-section
Construction site

P | 200 | 0 10 20

Category
Low Budget
Rapid Assembly
Reusable
Small impact on landscape

Project
Office for Mobile Design

Author
Lawrence Pugh (Pugh + Scarpa),
Jennifer Siegal (OMD)

Short description
Mobile home that has been converted into a “mobile center of construction training”, an initiaive whose aim is to provide owners with suggestions about how to maintain their houses. The center is a classroom-workshop used to teach the main techniques of building maintenance: plant engineering, capentry and painting. The mobile home measure 4, 27 x 19,8 meters. One of the walls on the longest side can be raised, leaving that side competely open: above it runs the gangway providing access to the classrooms. The translucent panels of the wall, inclined at a right angle, function a bise-soleil an regulate the gflow of air.

The project was made by students, thats why assembly of the mobile building was for free. Building material was collected by students, which reduced the costs of the building to a minimum.

Site
Venice, California, USA

Year
1998

Program
Portable Contstruction Training Center

m²
84,5

(19,8 x 4,3)

Cost
15,4 € / m²

(total cost 1300 €)

useful life, intended
Single use: 1 day
Total life span: permanent

Recyclability
No recycling concept

Construction
Steel framework
roof: wood construction

Material
Metal gratings
wood panels
roof construction: wood
floor: metal

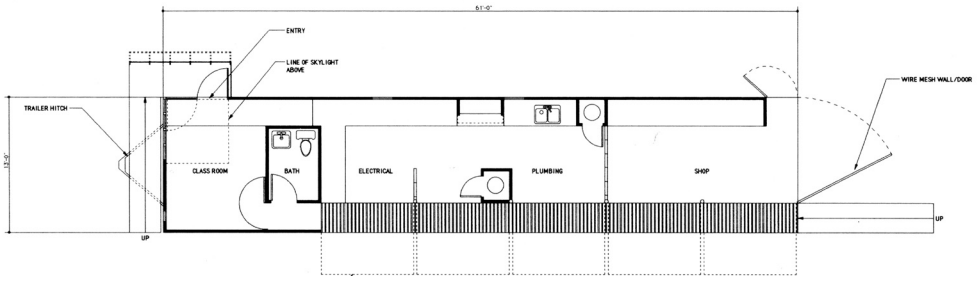
Installation
Plug in system for mobile homes

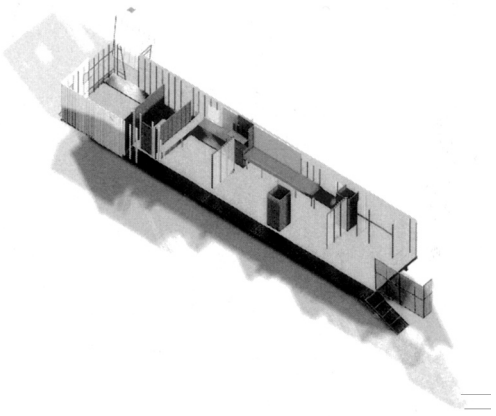
Foundation
no foundations,
on wheels

Building character

Source / Photograph Credits
- Lotus international 105, 2000, p. 36-37
- Siegal, Jennifer (ed): Mobile, Princeton Architectural Press, New York, 2002, p. 116 f

*View





*Plan
Axonometric projection

H 200 0 10 20

Category
Recycling

Project
Campamento turistico
Cayo Crasqui

Author
Jorge Rigamonti

Short description
Tourist village on the Carribean Sea in the area of a national park, attempts to make the smallest impact possible on the landscape of the corall atoll.
Small lodges, connected with a wooden boardwalk. Service facilities are concentrated in the main building and the cafeteria.

Site
Los Roques, Venezuela

Year
1991-1994

Program
tourist village

m²
18 m² per lodge

Cost

useful life, intended
3 years

Recyclability
Roof: Product recycling.
Lodges: Material recycling.

Construction
Doubled structure: wooden hut, covered by an sunlight roof.

Material
Lodge: wood
Roof: Textile membrane

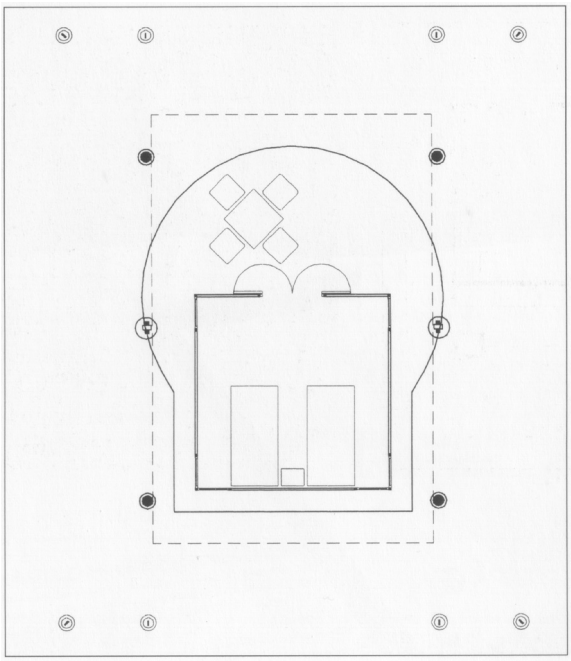
Installation
Installation concentrated in the main building and cafeteria.

Foundation
Low surface sealing (concrete slab)

Building character
-

Source / Photograph Credits
- Lotus international 105, 2000, p. 89 ff

*View



*Plan of a lodge

E | 200 | 0 10 20

Category
Reusable

Project
Info Box

Author
Schneider + Schumacher (Frankfurt am Main)

Short description
Temporary pavilion, erected within 3 months, raised seven meters above the ground to provide a view of the building sites at Potsdamer Platz. A three storey entrance hall affords access to a three storey exhibition space and other facilities.
Planned to be deconstructed and reerected somewhere else.

Site
Potsdamer Platz, Berlin, Germany

Year
1995-2001

Program
Exhitibion space, Information Center

m²
930 (building area)

Cost
3584 € / m²

useful life, intended
5 - 7 years

Recyclability
reusable

Construction
socket: concrete filled tubular steel struts. structure is braced by diagonal members in both directions.
building: steel pillars and beams

Material
steel beams, steel and concrete loadbearing slabs with trapezoidal section metal sheeting.
facade: stove-enamelled sheet steel panels

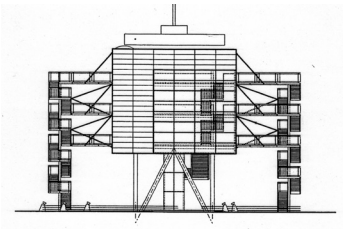
Installation
Standard installation of GWP

Foundation
Bored piles

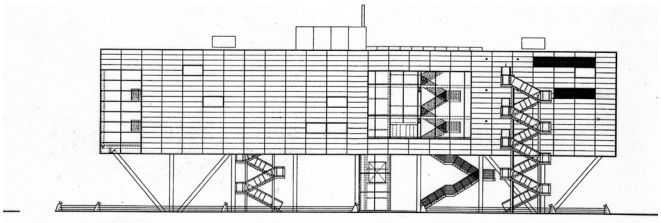
Building character
-

Source / Photograph Credits
- Detail 1996, 8, p.1221 ff
- AIT, 96/03: 72-77

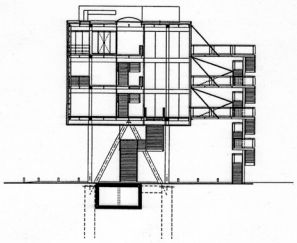
*View



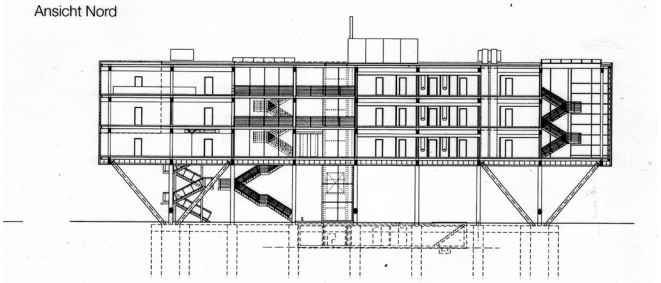
Ansicht Ost



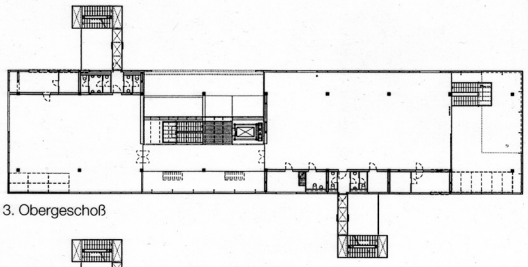
Ansicht Nord



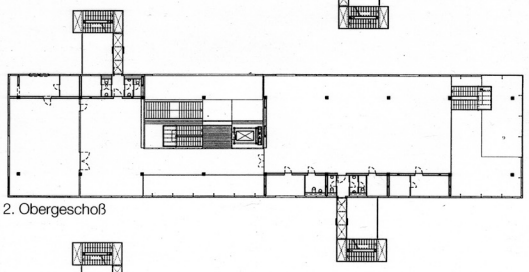
Querschnitt



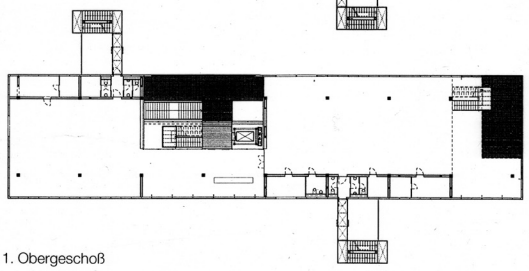
Längsschnitt



Grundriß 3. Obergeschoß



Grundriß 2. Obergeschoß



Grundriß 1. Obergeschoß

*Elevations
Sections
Plans

E | 200 | 0 10 20

Category
Reusable
Small impact on landscape

Project
"Sehnsucht"

Author
Studio Andreas Heller

Short description
Pavilion designed to house touring exhibitions. Two lorries that transport the entire construction form the back of the shell-like pavilion when it is assembled. They support the ends of the semicircle of aluminium grider elements. The lorries also provide space for an information centre and various events. A translucent membrane roof is drawn over the girders, the walls are clad with cellular panels.

Site
Köln

Year
1996

Program
Mobile Exhibition Pavilion

m²
400

Cost

useful life, intended
Single use: 1 week
Total life span: permanent

Recyclability
no recycling concept, reusable

Construction
Girder-coloumn construction, shell like, one edge supported by two lorries

Material
girder, columns - aluminium
roof - translucent membrane
walls - polycarbonate cellular panels

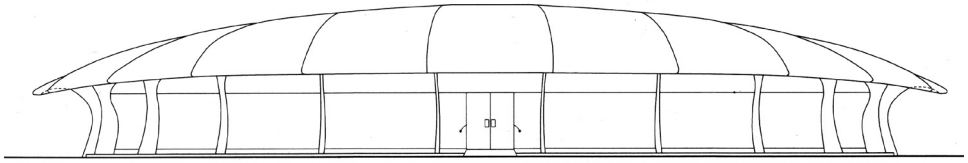
Installation

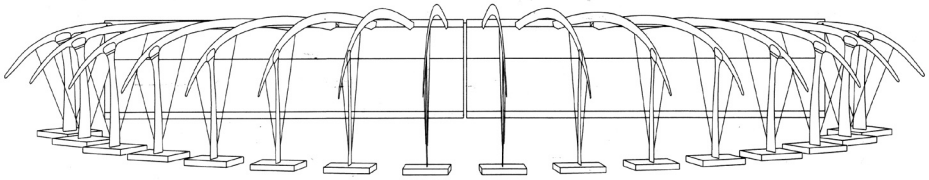
Foundation
Erected on a sealed surface.
Water-filled shallow containers fix the coloumn feet

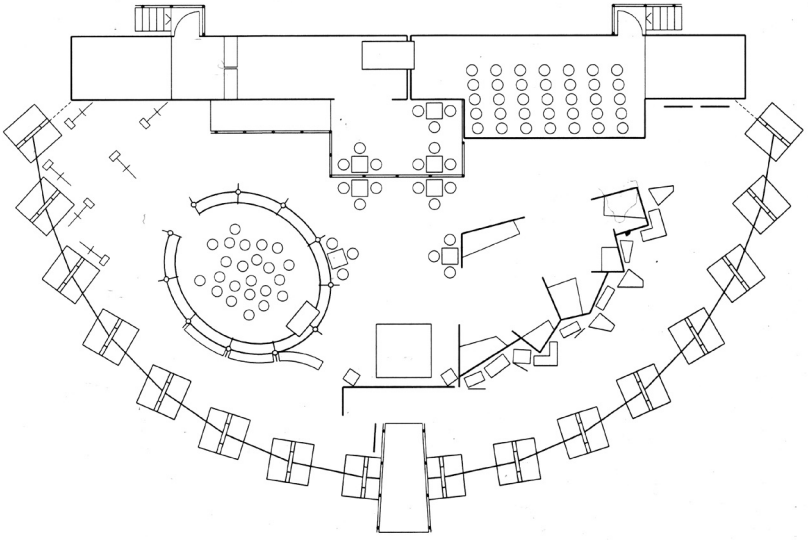
Building character

Source / Photograph Credits
- Detail 1998, 8, p. 1432 f

*View







*Elevation
Structural System
Plan

P | 200 | 0 10 20

Category
Rapid Assembly
Resuable
Small impact on landscape

Project
"Kulturmobil"

Author
Zvonko Turkali

Short description
Workshop to promote cultural contents at schools.
Truck with trailer that bears a box which ist constructed like a drawer. By wheel-away element the interior space can be enlarged from 2,5m to almost 5m. The truck can be used in both positions. Enlightment by 4 windows in the car-body wall, roof lights and glazed doors.
The interior fittings are constucted in a 60 cm grid. The furniture hang in vertical steel-rail to adapt the room to various needs.

Site
Frankfurt a. Main, Germany

Year
1996

Program
Workshop
for consultation for teachers, information, seminars, lectures

m²
29 (enlarged)

Cost

useful life, intended
Single use: 1 day
Total lifespan: permanent

Recyclability
No recycling concept

Construction
Truck with box of sandwich panels

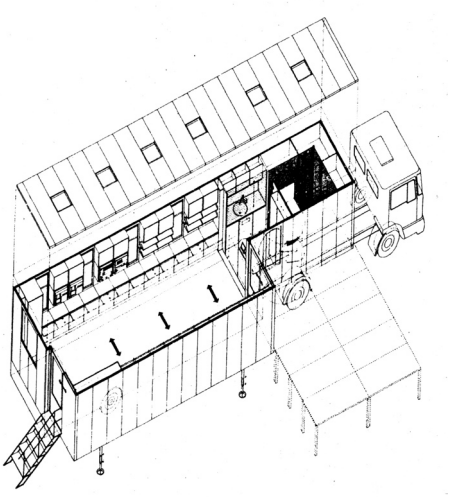
Material
Sandwich panels with plastic covered sheet metal.

Installation
Plug-in installation

Foundation
On wheels, no foundation

Building character

Source / Photograph Credits
- Detail 1996, 8, p. 1206



* View
Axonometric view

E | 200 | 0 10 20

Category
Modular
Recycling

Project
Swiss Expo Pavilion, Expo 2000

Author
Peter Zumthor

Short description
The pavilion is a "Timber labyrinth" that consists of piled wooden walls. There is no roof. Inside the labyrinth there are three-storey oval towers which house the service parts.

The structure is expected to shrink during the course of the exhibition, the walls will reduce their height. Therefore the springs will gradually reduce thei compression and constant supervision will be needed. The possible deformation is wanted by the architect .

Site
Hannover, Germany

Year
2000

Program
exhibition, art

m²
3000

Cost
3885 € / m²

(total cost 11.656.884 €)

useful life, intended
5 months

Recyclability
Material Recycling

Construction
piled wooden elements, hold together by stainless steel rods in tension, stressed by springs

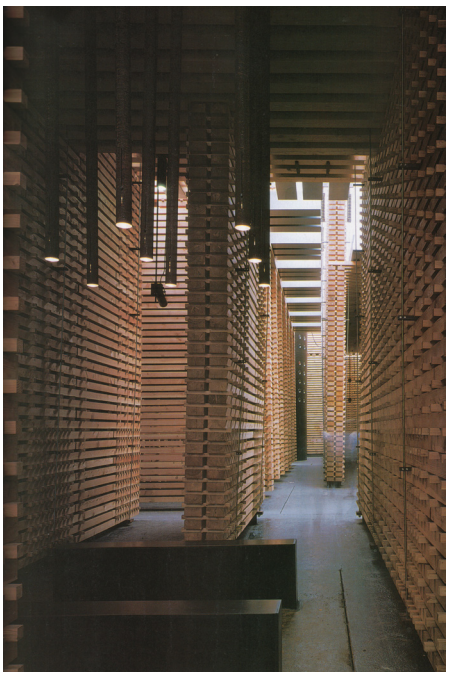
Material
timber (main horizontal member: pine, smaller cross pieces: larch)
stainless steel rods and springs

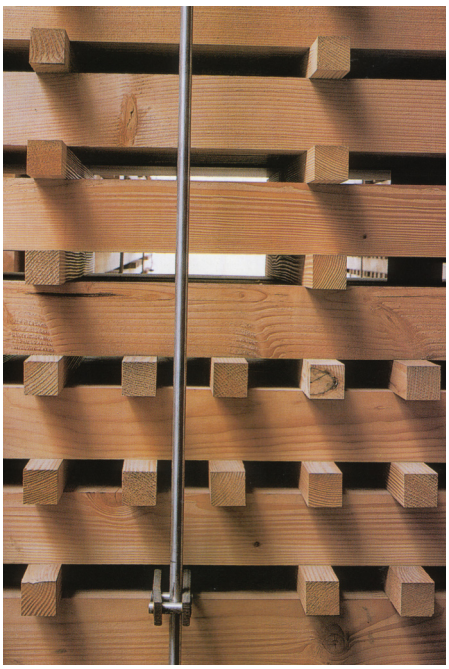
Installation

Foundation
Wooden floor panels
(no foundation necessary)

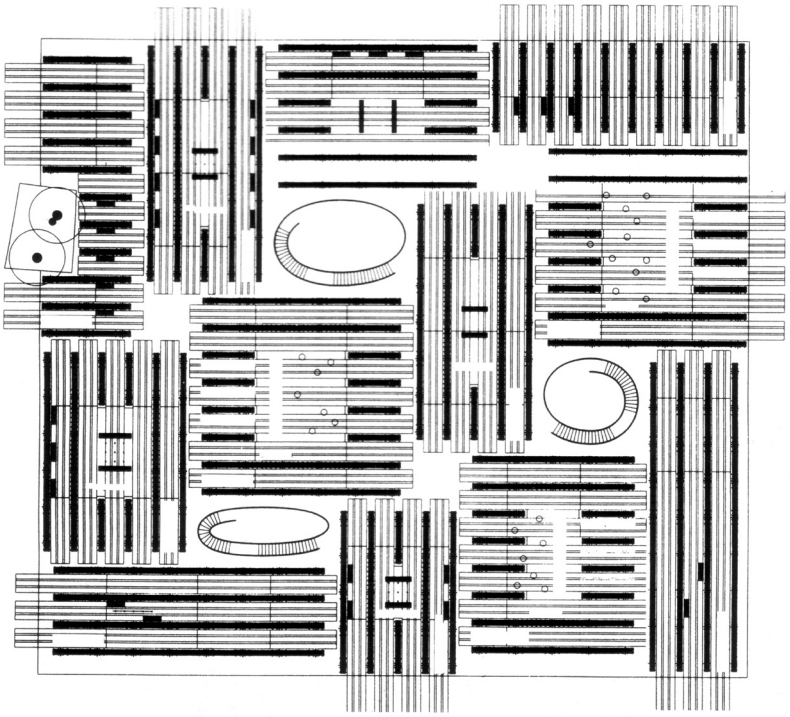
Building character

Source / Photograph Credits
- Arch. Rev., 2000, 1243, Sept, p. 50-53
- DB 2000, 09, p.88-103





*Interior view
Detail



*Plan

A | 50 | 0 10 20

Category
Rapid Assembly
Resuable
Small impact on landscape

Project
Geodesic dome -
Temporary Unfolding Structure

Author
Chuck Hoberman

Short description
Geodesic dome, 6m diameter when extended (only 1,5m when folded together). Set on five rollers, the core is simply pulled open in five directions. Once the rollers are locked, the structure provides a stable and robust geodesic form. Inside the dome a layer of fabric can be inserted that stretches into a membrane-like skin when thestructure is fully extended. This geometric system allows many different foms to be created, including spheres, ellipsoids, saddle-shaped structures, facetted polyhedra and freely shaped volumes. A final stalbe basic form can support loads not only in tis final extended position, bu in any intermediate stage of unfolding.

Site
UK

Year
1996

Program
Art installation

m²
19 m²

Cost
no information

useful life, intended
Single use: < 1 day
Total life span: permanent

Recyclability
No recycling concept

Construction
Geodesic dome of extendible arms, connected wiht bolts in slliding bearings.

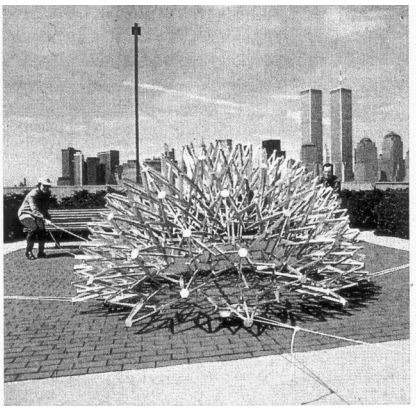
Material
Extendible arms and node poins : aluminium alloy
connections: stainless-steel bolts
inner roof: membrane

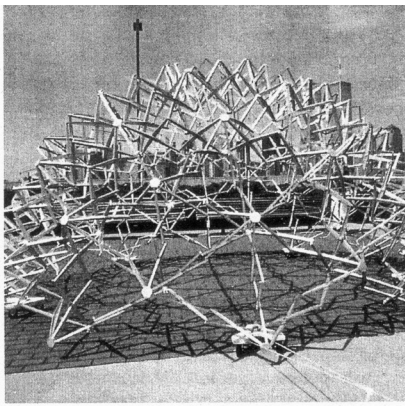
Installation
-

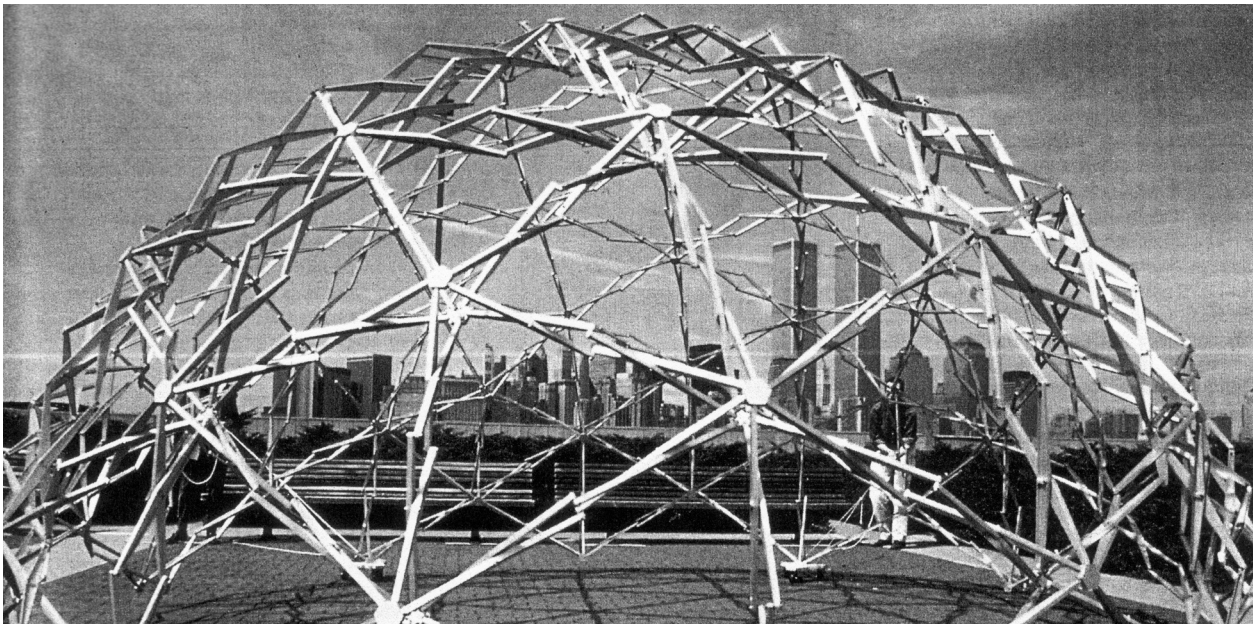
Foundation
On rollers,
no foundation

Building character

Source / Photograph Credits
-Detail 1996 8 p. 1184 ff







*Stages of unfolding

A | 50 | 0 10 20

Category
Reusable
Small impact on landscape

Project
Dwelling for Tokyo Nomad Women
Pao

Author
Toyo Ito & Ass., Tokyo, Japan

Short description
"Pao" for girls in Tokyo, a city of information and consumption. Some girls, so called "nomad women" sufing the waves of time and informtaion need no house, but only this pao, a small space, equipped with the following furniture:
- furniture for dressing up (dressing table, mirror and wardrobe)
- furniture of knowledge (information cockpit with integrated chair and table with magzines, electric devices)
- furniture for snacks (tea table with cupboard, electrica cooking stove)

This project was presented at an department store in Tokyo, later in Brussels. There it was housed in a space of steel pipes and fabric.

Site
Tokyo, Japan
Brussels, Belgium

Year
Tokyo 1985 (Pao1)
Brussels 1989 (Pao 2)

Program
Art Installation
Exhibition installation for furniture

m²
16 m²

Cost
No information

useful life, intended
single use: < 1 year
total life span: > 10 years

Recyclability
Material recycling

Construction
Pao: pipe dome with membrane.

Material
Pao: steel pipes, fabric (membrane)

furniture for dressing up: tube rings, glass, mirror and wires.

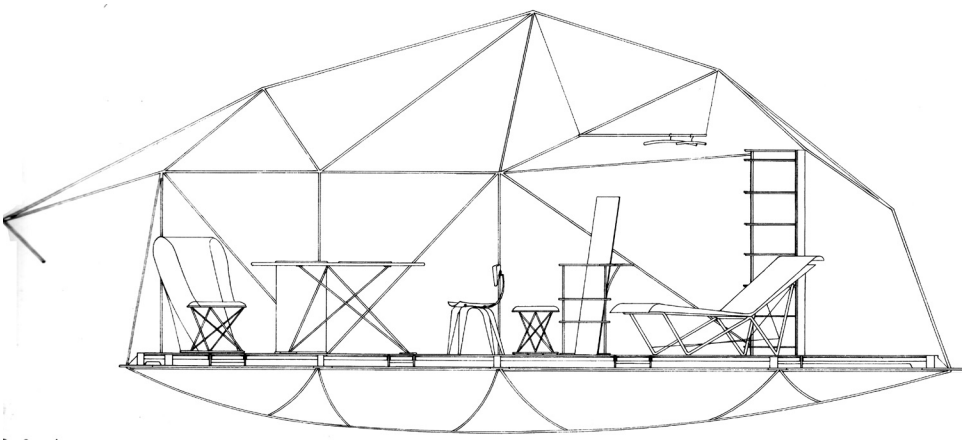
information cockpit: steel pipes, expanded metal panels and cloth

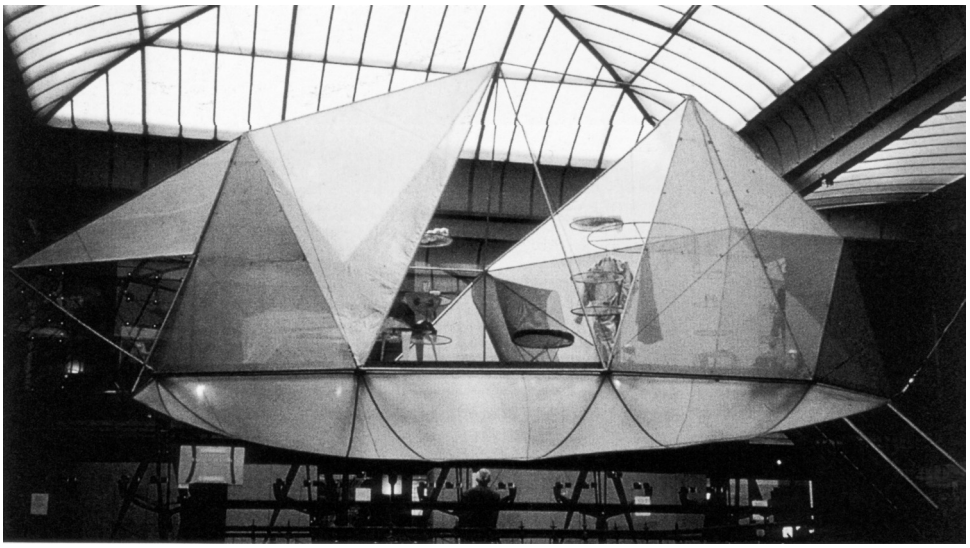
Installation
-

Foundation
No foundationh

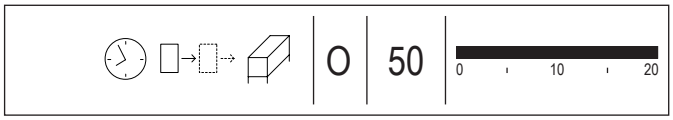
Building character
-

Source / Photograph Credits
- Ga Architect 17 2001, p. 36





*Section
View



Category
Rapid Assembly
Reusable
Small impact on landscape

Project
Mobile kitchen

Author
Gerhard Kalhöfer, Stefan Korschildgen

Short description
Kitchen element on rollers, used so furnished a large general space (in a rehabilitated 1920s house). Due there are no fixed furnishings also the kitchen can be moved to various positions and quickly installed according to needs.
The flexible layout and functional working of the kitchen are guaranteed by service boxes and by lighting fittings in ceiling tracks.

Site
Germany

Year
1998

Program
mobile kitchen furniture

m²
2 m²

Cost
No information

useful life, intended
Permanent

Recyclability
No recycling concept

Construction
30/30 stainless-steel SHS frame

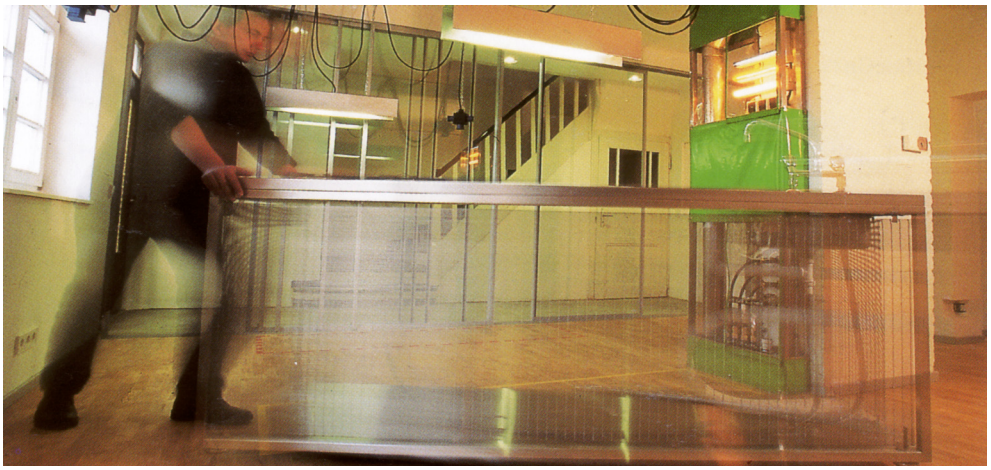
Material
Kitchen covered with stainless-steel mesh.
Installation boxes (in the room) covered with coloured plastic-sheet.

Installation
Plug-in installation.

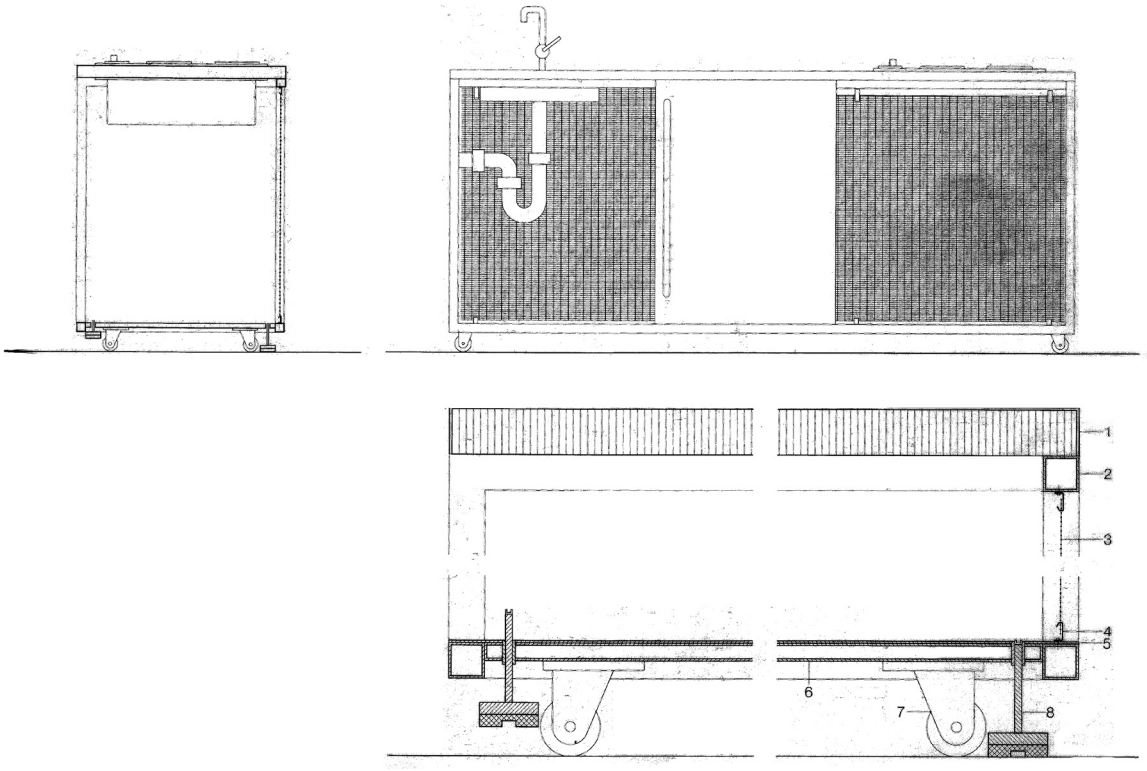
Foundation
On rollers

Building character

Source / Photograph Credits
- Detail 1998, 8, p. 1420 f



*View
Details



*Cross section - Longitudinal section
Section detail

A | 50 | 0 10 20

Category
Small impact on landscape

Project
Black Maria

Author
Hiroshi Nakao

Short description
Art installation which is standing in the garden of the Sezon museum of modern art, Karuizawa.
Two elements of timber frames with metal sticks on wheels, that can be moved and arranged in different configurations.
With its curving walls it suggest varying degrees of thickness. When closed, it forms a dark and deep hollow, when slowly opended, the hollow splits and a broad hole is produced. When the split reaches its full extent, nonetheless, the hole again disappears and the original hollow folds back on itself, like a glove, turned inside out. Now it looks like a thinly shaved flake. A folding screen that sucks space inward or rather inspires space and expires it.

Site
Karuizawa, Japan

Year
1994

Program
installation art

m²
19.5 m²

Cost
no information

useful life, intended
permanent

Recyclability
Material recycling possible

Construction
One-sided open boxes in the shape of wings, metal sticks at the open sides.

Material
Black-stained plywood
ash
concrete
steel

Installation
-

Foundation
On steel wheels,
no foundation

Building character

Source / Photograph Credits
- Lotus international 111, 2001, p. 58 f
- Richardson, Phyllis: XS:Big Ideas, Small Buildings, Thames & Hudson Ltd, London, 2001, p.80 ff

*View
Plans - different configurations

A | 50 | 0 10 20

Category
Low budget
Rapid Assembly
Reusable
Small impact on landscape

Project
Elementary House

Author
Martin Ruiz de Azúa

Short description
The elementary house is one room and easy to use because it requires no assembly and it fits in the pocket. It is to blow up, it should "unfold of body and sun warmth", and gives a shelter to cold and heat, it is so light (the membrane weights 200 grams), that it swims. When air streams through the lower opening, it blows itself up. The room is only 8 m³.
Inside it is light, because the membrane is transluzent. At night, without sunlight, it sinks down and becomes a blanket for the inhabitant.

Site
Spain

Year
2000

Program
Art

m²
4 m² (inflated)
8 m³ (inflated)

Cost
50 €

useful life, intended
> 1 year (variable)

Recyclability
no recycling concept, reusable

Construction
inflated pneu

Material
Double-sided metal polyester (reversible: silver against the heat, golden against the cold), 200gr.

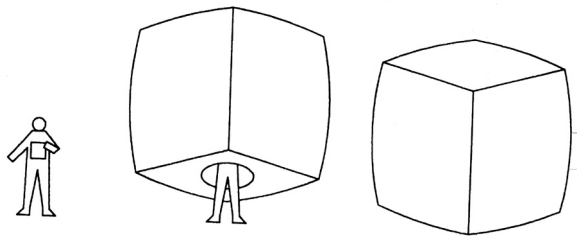
Fabric manufacture / development: Pai Thio

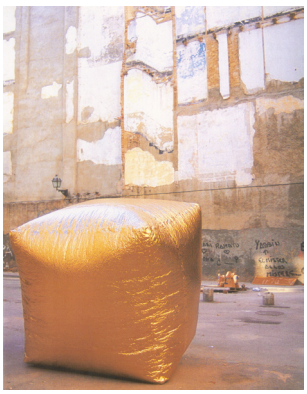
Installation
No installation

Foundation
No foundation necessary

Building character

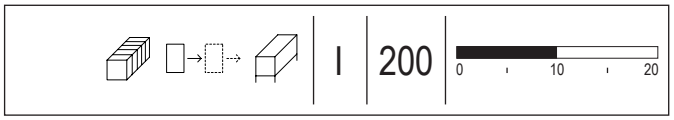
Source / Photograph Credits
- Richardson, Phyllis: XS:Big Ideas, Small Buildings, Thames & Hudson Ltd, London, 2001, p.204 ff





*Concept
Views: folded - unfolding - unfolded

4 Objekte mit partiellem Bezug



Category
Modular
Reusable
Small impact on landscape

Project
Neumayer Research Station II

Author
Alfred-Wegener-Institut
für Polarforschung und
Meeresforschung (AWI),
Germany

Short description
The Neumayer Research Station is the german Research Station in the Antartica.
The stations shape is similar to the character "H": 2 tubular metal structures standing parallel to each other and are connected in the middle by an alley. Each tube is 90m long and 8m in diameter.

Every 10 years a new station has to be built, because of the heavy snow fall (the gain of snow is about 2 m yearly). In 2003 the Neumayer station II was buried under the snow as deep as 10 m.

Site
Antarctica

Year
1992

Program
Research Station

m²
1600 m²
(each tube 730 m²)

Cost

useful life, intended
~ 10 years

Recyclability
No recycling concept
container resuable

Construction
Under construction: steel structure
Roof: corrugated metal

Material
Tubular roof: corrugated metal
metal container (isulated)
Construction: steel

Installation
Power generator
Ice melting maschine
Wind power

Foundation
Platform,
no foundation necessary

Building character

Source / Photograph Credits
www.awi-bremerhaven.de/polar/neumayer1-d.html

*Construction

*Interior view

I | 200 | 0 10 20

Category
Modular
Reusable
Small impact on landscape

Project
Halley Research Station V

Author
British Antarctic Survey, UK

Short description
The british antarctica research station Halley was founded 1957 by the British Antarctic Survey. The population of the research station varies between 16 pers. (winter) and 70 pers. (sommer).

So far there are 5 stations build. The first 4 stations are burried under snow after approx.10 years. Different constructions have been build, from a simple wooden hut to steel tunnles.

The newest station "Halley 5" is a platform which is floating ~4m above the snow surface, and will be lifted every year, to avoid the pressure of the ice and snow on the building.

Site
Antarctica

Year
1991

Program
Research Station

m²
Halley V accomodation bldg 900 m²
(largest building)

Cost

useful life, intended
Halley I - IV: ~10 years

Halley V: > 10 years

Recyclability
No recycling concept

Construction
Steel platform on 20 columns,
underground structure: steel frame

Material
Steel
Container

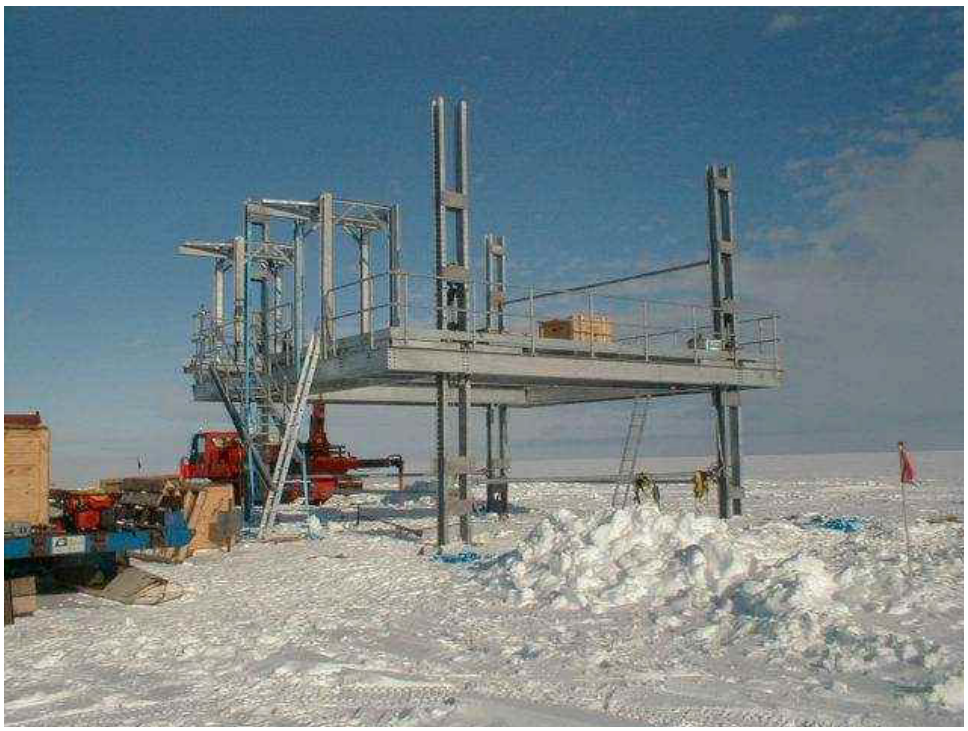
Installation
Water supply:
ice melting maschine
Power:
power generator

Foundation
Building on columns
(platform can be lifted, to avoid
pressure of the ice on building)

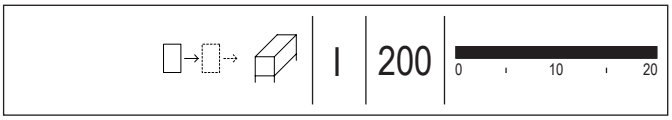
Building character

Source / Photograph Credits
www.smitha.demon.co.uk/zfids

*Exterior view



*Construction



Category
Reusable
Small impact on landscape

Project
Dome C, Concordia

Author
Fave, Jean-Paul
(Fance / Italy)

Short description
New Antarctic science station (glaciological research) of the French and Italian, built 1999-2004 by building team manager Serge Drapeau from French Polar Institute (IFRTP) and an italian-french team of 10 building workers.
The station consists of 2 elevated, cylindrical buildings with 36 faces and 3 floors, connected by an enclosed bridge about 10 meters long. This solution provides a clear separation between areas where noise is produced and areas were peace and quit are wanted by locating them in 2 well-separated buildings. Dome C buildings can be raised to stay above the snow. The uplifting is supposed to be performed every 10 years. The base is designed for 16 people year-round, with double that many for a month during the annual change-over period. The station is supplied by regular Twin Otter flights and 3 times a year by a truck traverse from Dumont d`Urville.

Site
Antarctica

Year
2004

Program
Research Station

m²
1614
(each dome is 18,5 m in diameter and has a ground space of 269 m² on 3 storys)

Cost
19206 € / m²
(total cost 31 mio €)

useful life, intended
> 20 years

Recyclability
No recycling Concept

Construction
Steel framework

Material
Steel construction
metal panels for wall and facade (insulated)

Installation
Power generator
Ice melting tanks

Foundation
Piles

Building character

Source / Photograph Credits
www.polar.org/antsun/oldissues2001-2002/2002_0120/concordia.html
www-lgge.ujf-grenoble.fr/eng/presentation
www.innovations-report.de/html/berichte/geowissenschaften/bericht-7056.html
www.gdargaud.net/Antarctica/Concordia.html

*Construction site

I | 200 | 0 10 20

Category
Reusable
Small impact on landscape

Project
Oil Platform Maersk Guadrian

Author
Maersk, DK

Short description
Oil platforms are standing on a fixed concrete or steel base. The program compartments of an oil platform are: Oil- and gas production, drilling, refinery, and hotel. For the operating procedure are 100 workers necessary. Jack-up drilling platforms are used in the shallow water (< 100m) of the north sea.
The Oil platform can be transported on special transport ships. The columns of the oil platform are folded up during the transport and get extended to the ground at the place of destination. The platform gets lifted up when stabilized on the ground.

Site
North sea, DK

Year
1982

Program
Oil Platform

m²
6956 m²
(74 x 94 m platform, 100m h)

Cost
Operating costs:
140.000 € daily

useful life, intended
> 20 years

Recyclability
No recycling concept

Construction
Four steel columns

Material
Steel columns
Steel and concrete platform, which is movable in vertical direction

Installation
Power generator
fuel tanks
water tanks

Foundation
no foundation
(steel columns standing on ground)

Building character

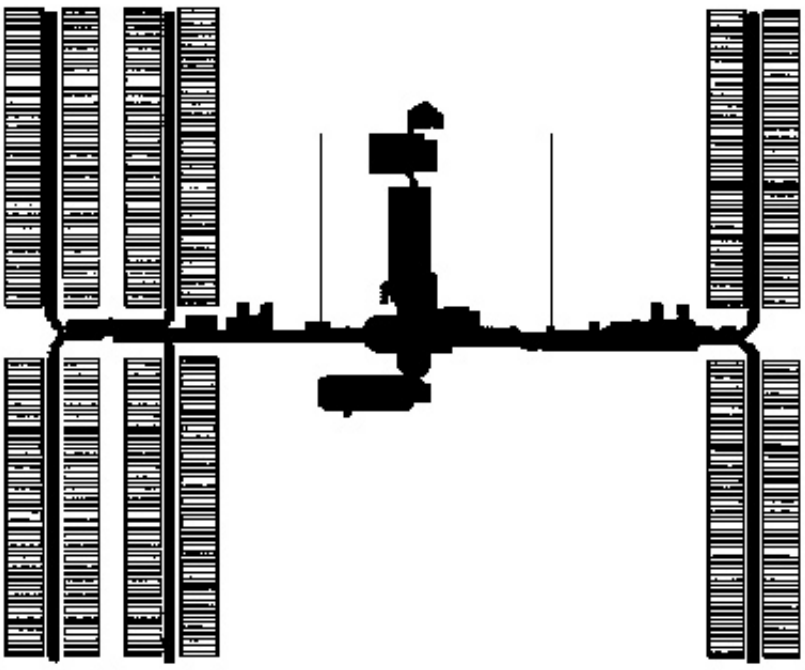
Source / Photograph Credits
www.northsea-guide.com

*View

I | 200 | 0 10 20

Category	Project	Author	Short description
Small impact on landscape	MIR spaceshuttle	Posaviakosmos, UdSSR Korolev	The Space Shuttle MIR ("peace") started to round the earth in 1986. The MIR complex was 32m long and 31m wide, and had a weight of 140 t. The inner space of the core consisted out of different quarters. At the end-modul was a round docking-station. The MIR was supplied by Progress-capsules. The tranport of the people was provided by Sojus. The basic module of the MIR contained accomodation and sanitary space, energy- and life supply, docking station and working section. Many different modules docked on until 1996: Kwant1 (Research unit) 1987, Kwant2 (Airlock, solar panel) 1989, Kristal (solar panel, biology lab, interconnection system) 1990, Spektr (solar panel, earth observation, research instruments) and Suttle-Dock (module with docking station for US Space Shuttle) 1995, Priroda (Earth observation, research instruments) 1996. Controlled crash of the MIR was in March 2001.
Site Universe	**Year** 1986	**Program** Space shuttle	
m² original core module: 60 m² (15 x 4,15 m)	**Cost**	**useful life, intended** planned lifespan: ~ 5 years actual lifespan: 15 years (1986-2001)	**Recyclability** no recycling concept
Construction steel structure	**Material** ceramics crystal modules MGM, ARIS, ETTF, TEHM ablative heat shield metal	**Installation** solar panels fuel tanks water tanks orbiter fuel cells **Foundation** -	**Building character**

Source / Photograph Credits
www.raumfahrtgeschichte.de/space4/page3c.htm



*plan

I | 200 | 0 10 20

Category	Project	Author	Short description
Reusable Small impact on landscape	Saipem7000	Saipem Group	This vessel built in 1987 by Fincantieri of Italy under Class specifications by RINA, with eight engines, four propellers and 10 thrusters is an impressive sight. Saipem7000 is the largest mobile crane platform of the world. Such a large crane vessel is used to install offshore production platforms and other heavy structures, world-wide in open sea.
Site wordwide	**Year** 1987	**Program** Offshore Construction	
m² 17226 m² (198 x 87m) draft: 45 m	**Cost**	**useful life, intended** > 20 years	**Recyclability** no recycling concept
Construction Steel construction	**Material** steel metal panels	**Installation** water tanks fuel tanks power generator **Foundation** -	**Building character**

Source / Photograph Credits
www.northsea-guide.com

*View

I | 200 | 0 10 20

Category
Rapid Assembly
Reusable
Small impact on landscape

Project
MobiCell

Author
BMW Group
Arup GmbH
Strama-MPS

Short description
The goal is to guarantee the location flexibility for the whole factory. For this mobile building concepts are necessary. The mobile module unit for a BMW factory in Germany was developed through interdisciplinary teamwork of BMW Group, Arup, and Stram-MPS.
The displacement of factories need new transport and logistic solutions, which was made possible by the transport- and logistic specialist SCHLOPP.

Site
Germany

Year
2004

Program
mobile factory

m²
28 m²

Cost

useful life, intended
> 10 years

Recyclability
no recycling concept

Construction
steel framework

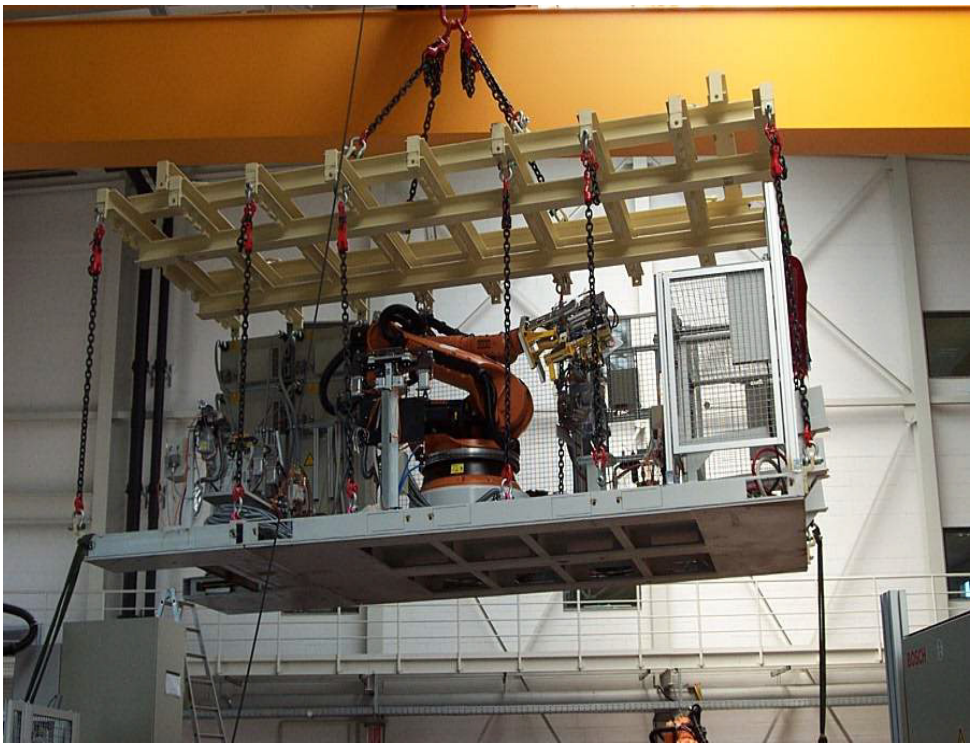
Material
steel
metal
production machines

Installation
all necessary installation integrated

Foundation
foundation integrated

Building character
-

Source / Photograph Credits
www.fakt.udk-berlin.de



*Installation

I | 200 | 0 10 20

Category
Modular
Rapid Assembly
Reusable
Small impact on landscape

Project
MobiFak-Modul

Author
Scott Zwiesel AG

Short description
Business concepts for globally distributed production sites. “MobiFak - Development of a business concept for mobile factories” focuses on developing a business concept for the operation of “mobile factories”. Key factor in this concept is the combination of modular manufacturing resources and modular services corresponding to the requirements of the applied manufacturing concept and the focused location.
The factory of Schott Zwiesel AG has a satellit for manufacting high-quality glass. Satellit beinhaltet alle zur Endfertigung von Trinkgläsern erforderlichen Prozessschritte, and they are zerleg- und transportierbar. Dies ermöglicht eine Verlagerung aller Ressourcen in kürzester Zeit. Somit werden die Produktionssatelliten in der Lage sein, sich optimal an neue Standorte und deren Faktoren anzupassen. Hierdurch ist das Unternehmen in der Lage, gezielt auf die Kundenwünsche in einzelnen Teilmärkten einzugehen sowie Logistikaufwände zu reduzieren. Zentrale Sicherung des Verfahrens-Know-hows in Deutschland.

Site
Europe, Asia

Year
2004

Program
mobile factory unit

m²
28 m²
(40´container: 12,02 x 3,35 x 2,69m)

Cost
no information

useful life, intended
> 10 years

Recyclability
no recycling concept

Construction
steel framework

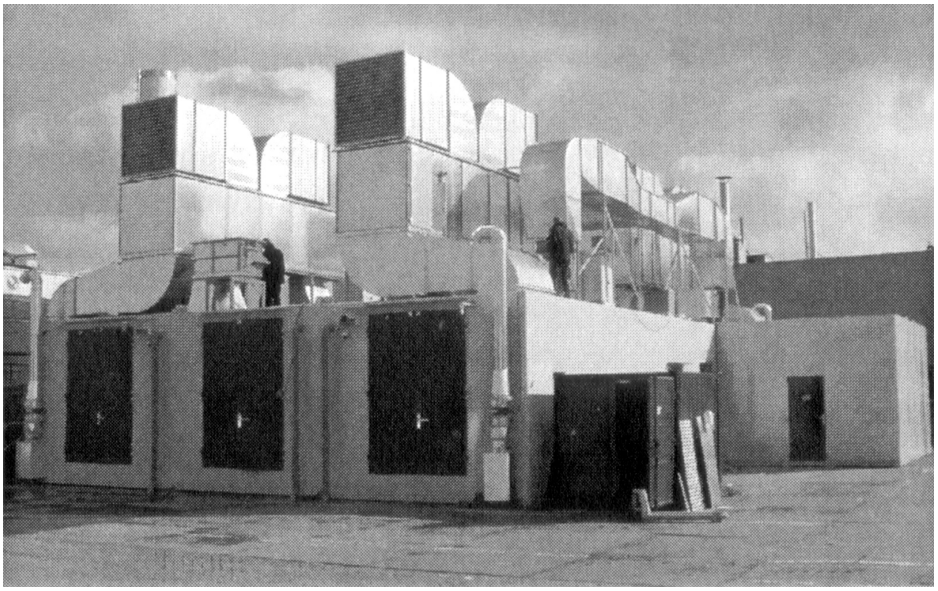
Material
steel, metal,
production machines

Installation
all necessary installation integrated

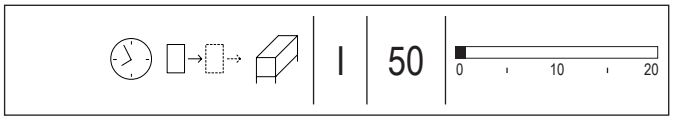
Foundation
foundation integrated

Building character

Source / Photograph Credits
- Schuh, G./ Merchiers, A./ Kampker, A.: MobiFak-Geschäftskonzepte für mobile Fabriken, Springer-Verlag, Berlin, 2004
- www.interconnections.de



*Concept diagram



Category
Rapid Assembly
Reusable
Small impact on landscape

Project
Portable sawmill

Author
WoodMizer

Short description
Mobile saw machine on wheels, transported like a trailer of a car or tractor. Can be transported direct to the forest or the stockground of the wood, that should be sawed. So the costs of the transport of the wood to a sawmill can be saved.
A building for the sawmill is no longer necessary.

Site
Various sites,
Europe, USA

Year
1995

Program
portable sawmill
bandmill & wood processing

m²
Variable

Cost
~20.000 €

useful life, intended
Single use: 1 day
Total lifespan: permanent

Recyclability
Reusable

Construction
Mobile saw on wheels,
steel construction

Material
Steel

Installation
None (runs with combustion engine)

Foundation
No foundation,
on wheels

Building character

Source / Photograph Credits
- www.mobilessaegewerk-theobuss.de
- www.mobiles-saegewerk.de
- www. waldwirtschaft-gochler.de/saegewerk
- www. woodmizer.com
- www.woodmizer-planet.com

*Views