

Modern Construction in Japan

Frans van Gassel

Technische Universiteit Eindhoven

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Construction in Japan

- Culture - Architecture - Housing
- Construction Systems
- Robotics
- Construction Site
- Building Systems

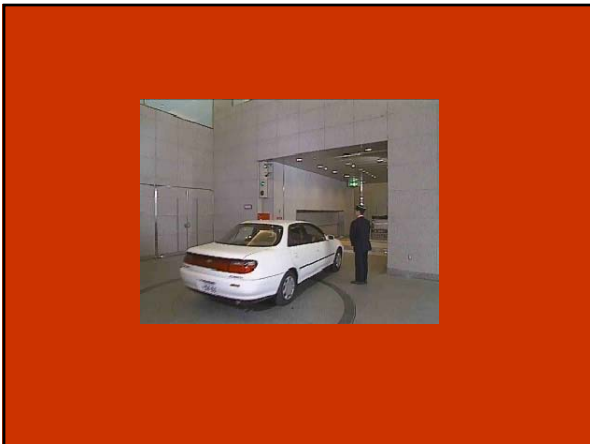
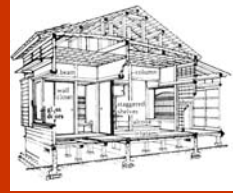
ENJOY YOUR STAY
BUT
PLEASE FOLLOW THE
RULES



Future cities



Sky City, Mega City

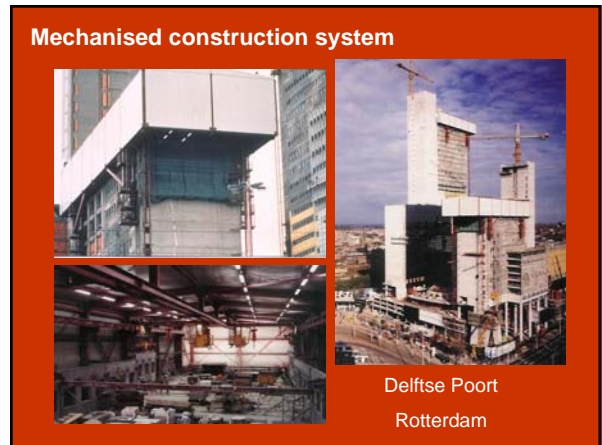




Construction systems

A construction system is a technical installation, assembling building parts into a building.

An installation is a collection of equipment, computers, telecommunication devices and people working alone or together.



Types of construction systems

Type of construction system	Physical tasks	Cognitive tasks	Control tasks
Traditional	•People •Equipment	•People	•People
Mechanised	•Equipment	•People	•People
Mechatronised	•Equipment	•Computers •Telecommunication devices	•People
Automated	•Equipment	•Computers •Telecommunication devices	•Computers •Telecommunication devices

Construction tasks

Three kinds of tasks:

1. Physical tasks
 
 - Performed by:
 - Workers
 - Equipment
2. Cognitive tasks
 
 - Computers and software
 - Means of communication
3. Control tasks
 

AUTOMATED CONSTRUCTION SYSTEMS

Structure	Type of Plant		System	Company
SRC	Fixed Plant	Pushed-up	AMURAD	Kajima
RC	Lifted-up Plant	Outer Mast	BIG CANOPY	Obayashi
			NEW SMART	Shimizu
		Mast on Column	SHUTTRISE	Kajima
S/SRC	Lifted-up Plant	Inner Mast	SMART	Shimizu
			ROOF PUSH-UP	Takenaka
		Mast on Column	ABCS	Obayashi
			T-UP	Taisei
			MCCS	Maeda
			AKATSUKI-21	Fujita
FACES	Goyo			

Applied to more than 20 construction sites

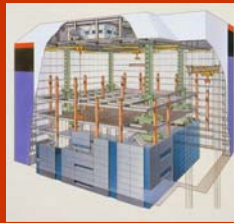
The aims to use construction systems are:

- All weather construction site: no wind, sun and rain.
- Safe work conditions.
- Reduction of manpower.
- Shorten construction period by modularization and prefabrication.
- Intelligent construction management by computer and communication technology.



SMART System
(Shimizu Corporation)

- Hat-truss, Mast
- All-weather Covering
- Transportation Equipment
- Lift-up Mechanism



Shuttrise System
(Kajima Corporation)

ABCS = Automated Building Construction System

Three main elements:

- Super Construction Factory (SCF)
Roof, Surrounding Walls, Outer Scaffolds
- Parallel Delivery System (PDS)
Material Lift, Jib Crane, SCF Telfer, SCF Crane
- ABCS Integrated Management System
Software Technology Consisted Four Systems

OBAYASHI Corporation
ISARC 2006 Tokyo

Combined ABCS and CCM
= Hybrid ABCS
4. Results

4-3 Under TFC (Typical Floors Construction) (Hybrid ABCS)

- Nth floor : Steel Frame Work
- N-1th floor : Working Floor
- N-3th floor : Slab Reinforcements Arranging
- N-4th floor : Slab Concrete Placing
- N-6th floor : ACW Installation

Next Construction Processes after Steel Frame Work can start on every one floor without Time Lags

OBAYASHI Corporation
ISARC 2006 Tokyo

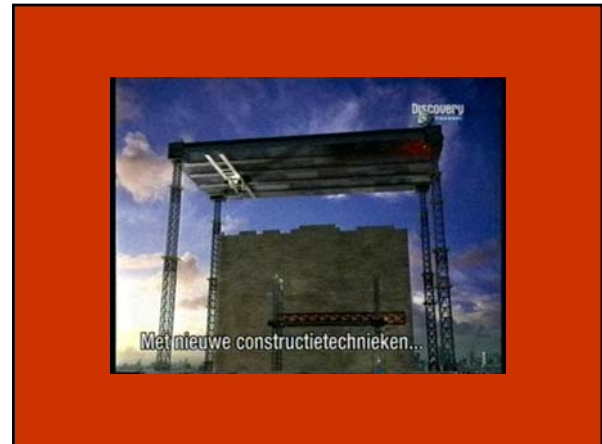
Combined ABCS and CCM
= Hybrid ABCS
4. Results

4-4 Labor Yardstick (per unit weight) for Assembling and Dismantling SCF

Legend:

- Red: Scaffold Erection
- Blue: Blockwork & Wallwork for Steel Work
- Green: Blockwork & Wallwork for Other
- Yellow: Make
- White: Mechanical & Electrical Work

18 Labor Yardstick of project O was about 20% lower than project N2



AMURAD

Reduction of construction duration
Improvement of quality
Stabilization of the cost
Improvement of working safety
Free from the limitation of the height

Eleven-Story Building Going Up the AMURAD Way

Kajima has developed a fully automated building construction method, AMURAD, where the top floor of a building is constructed first, then raised so that the next floor can be constructed beneath it. This method is being used on the (tentatively named) Yokogawa Construction New Headquarters Project, scheduled for completion in September 1997. In January 1997, the 11th floor section, which is the top floor, was lifted up and secured into position.

Work of this construction work is an advanced construction factory

Establishment of working floor

Completed Floor

Reverse finishing work Floor

Utility external work Floor

Structural work

Structural members installation

Vertical transportation and supply of material

Direct supply of members

GROW UP

TA-CARRU

TA-MAND

TA-UP

Korea

Hakata Station of Shinkansen

Tower crane

Assembling yard

Finishing yard

Traveling unit

Control room

Traveling direction

RFL

7FL

6FL

5FL

4FL

3FL

During traveling

Traveling Method

Breaking Construction Effectiveness in Dense Metropolitan Environments

We realize that you are not going to be merely satisfied with just the accurate creation of a good design. We know that if you were in charge of a certain project, you would look for the kind of expertise that could also bring down construction time and come to completion within budget. Takenaka has been a leader in developing many systematized construction methods that address these issues and more. The methods we introduce here are part of a revolutionary unified system. Takenaka possesses the technical expertise to resolve all the tough issues that construction work can pose.

Umeda Sky Building

Lifting girder

Winch rope

Aerial hoist

Winch rope

Aerial hoist

Winch rope

Aerial hoist

Winch

Winch





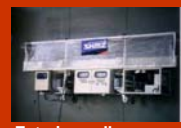

Winch

During lift up




Lift up completed



Construction robots

		
Concrete finishing	Steel frame welding	
		
Ceiling panel positioning	Exterior wall spraying	Fire-proof spraying

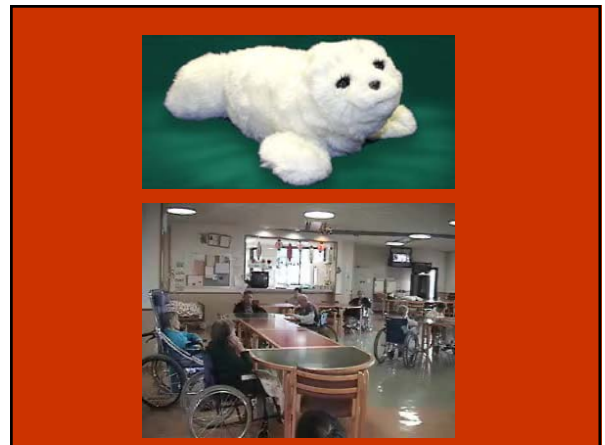
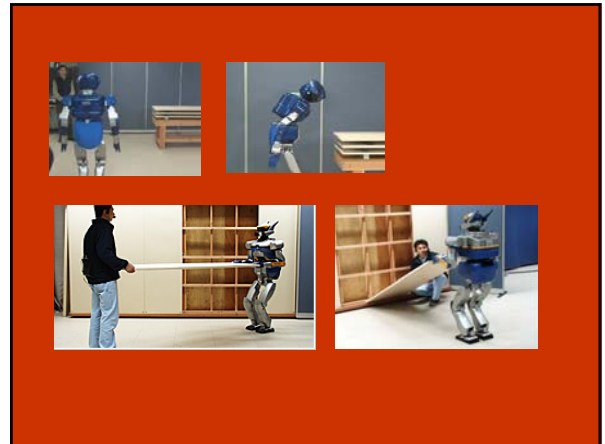
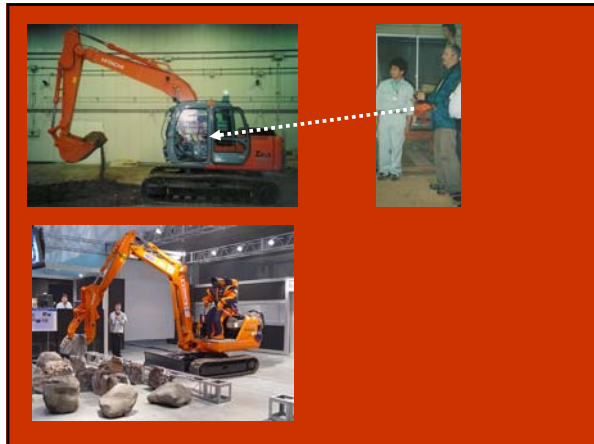
Construction robots

 Remote Releasing System (Shimizu)	 Concrete Surface Finishing Robot (Kajima)	 Wall Panel Handling Robot (Kajima)
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Humanoid robots





Construction site





Reduce 3K works in construction sites:

- Kitanai=dirty,
- Kitsui=hard and painful
- Kiken=dangerous







Modular building systems



