

TECHNOLOGIES IN THE
CONSTRUCTION PROCESS
ASPECTS OF SELECTING THE
TECHNOLOGIES
TIME-SEQUENCE OF
THE CONSTRUCTION WORKS

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Basics of construction

13-07-29

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Aspects of selecting the technologies

Technologies in the construction process

Time-sequence of the construction works

INTRODUCTION

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TECHNOLOGY

DEF:

Construction technology is the sum of **all work processes** of a work activity.

The **know-how** of the construction.

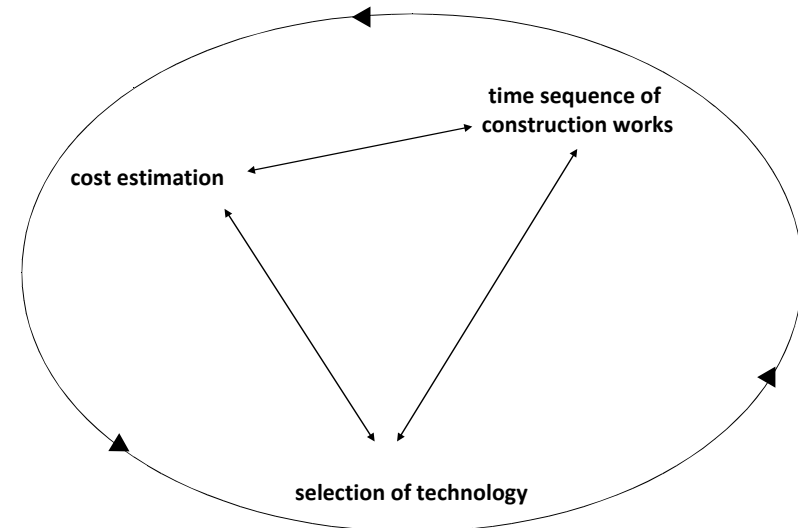
SELECTING THE TECHNOLOGIES

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SELECTING THE TECHNOLOGIES

influencing factors



SELECTING THE TECHNOLOGIES

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ASPECTS OF SELECTION

- technical circumstances
- cost
- required time -> cost
- workability / viability
- requirements in equipment / tools = What tools /equipments are at the contractor's immediate service? / What has to be hired?

COST ESTIMATION

- cost of the technology
- costs of the materials used
- cost of the time
- additional costs

e.g. - scaffolding

TIME ESTIMATION

- time of the work activity
- required time of the technology
- costs depending on time

e.g. – AAC / clay block

THE PHASE OF THE PLANNING

workability / viability

- workable / viable details
- optimal choices of technology based on local human sources
- details considering the expected (expectable) accuracy of the local construction industry

Technologies in the construction process

- construction of substructures
- construction of superstructures
- finishing works (+ electric wiring and building installation works)
- gardening, etc.

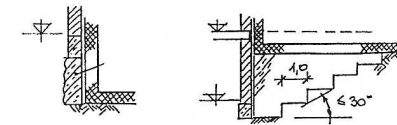
Harmonizing foundation levels

Influencing factors

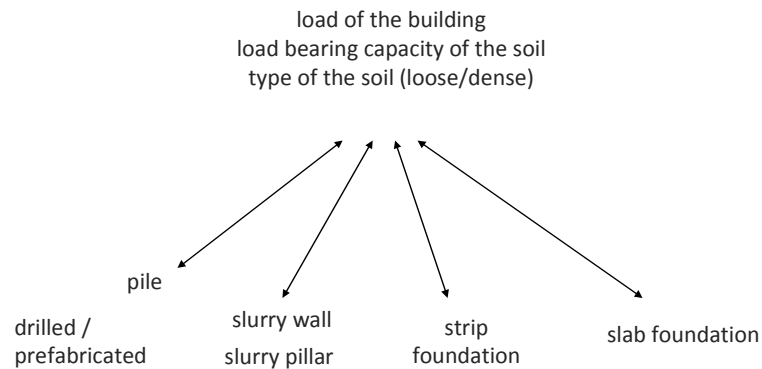
- necessary depth of excavation pit
- foundation level of the neighboring buildings
- foundation level of the constructed building
- characteristics of the soil

Options

- placing subsequent strip foundation under an existing building
- slurry wall
- jet grouting
- injecting
- pile-wall



Selecting foundation type



Monolithic reinforced concrete structures selecting technology

Vertical structures (wall, pillar)

- reinforcement
- formwork
- concrete placement

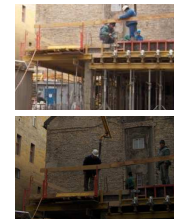
horizontal structures (slab)

- formwork
- reinforcement
- concrete placement

work
sequence

Drilled piles, slurry wall

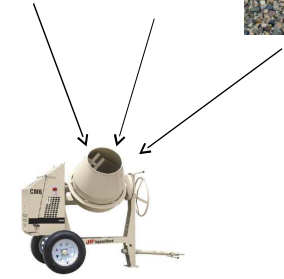
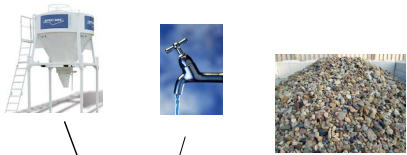
- concrete placement
- reinforcement



Monolithic reinforced concrete structures selecting technology

Concrete supply

influencing factors:
cost, time, owned equipments, required quality, etc...



In-situ concrete



transport concrete

Monolithic reinforced concrete structures selecting technology

Formwork system – for horizontal structures



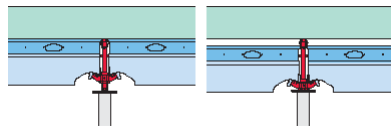
modular tables (pre-assembled)



panelized slab drophead formwork system



girder slab formwork



work speed <-> flexibility

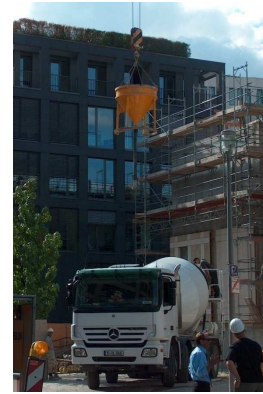
work speed <-> flexibility

Monolithic reinforced concrete structures selecting technology

Concrete placement

influencing factors

scale of the concrete work



with concreting bucket



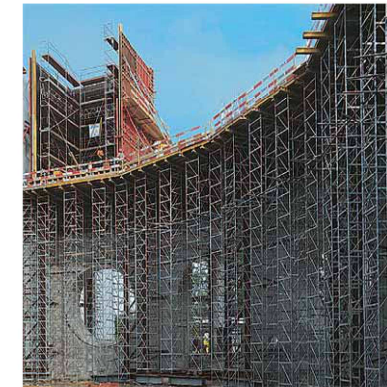
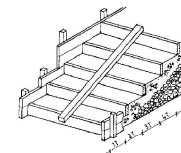
with concreting pump

Monolithic reinforced concrete structures selecting technology

Formwork system – special solutions for horizontal structures



variations of the systems



special heights

Monolithic reinforced concrete structures selecting technology

Formwork system – for vertical structures



girder wall formwork system

(single faced <-> double faced)



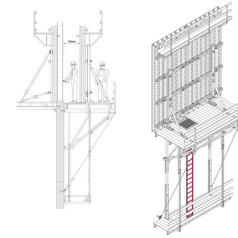
metal panel formwork wall formwork system



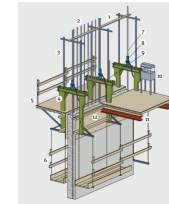
pillar formwork

Monolithic reinforced concrete structures selecting technology

Formwork system – special solutions for vertical structures



climbing wall formwork system



sliding formworks



self climbing systems

No crane is needed!



circular wall formworks

Masonry

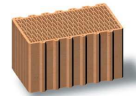
Bricks and blocks - materials



AAC*block



clay blocks



high accuracy
clay blocks



ceramic bricks - facade bricks



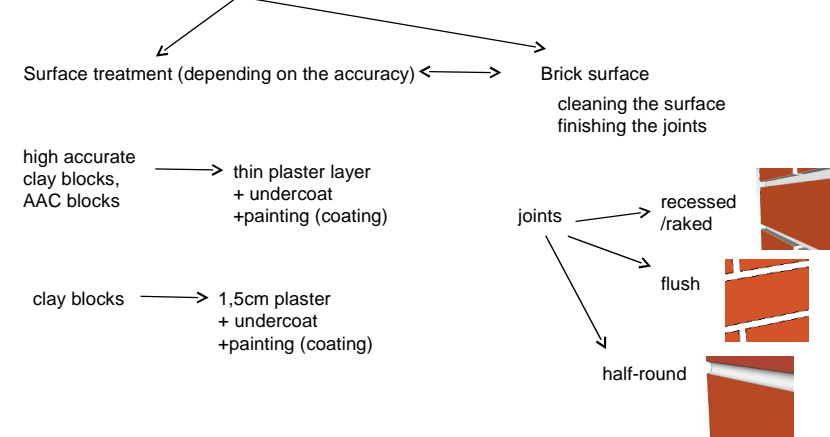
lime-sand bricks and blocks

*autoclaved aerated concrete / porobeton

Masonry

Steps of technology

- set up the first course (dimensions, water level, etc.)
- laying the second, third, etc. courses
- jointing / grouting
- surface



Masonry

Wall types



brick walls

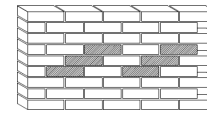


block walls

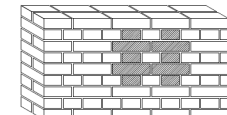
single or multi unit course \longleftrightarrow

single unit courses

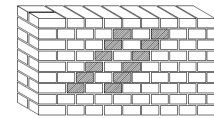
Masonry – Brick wall bond types



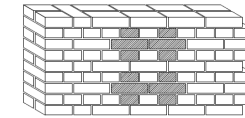
stretched /running bond



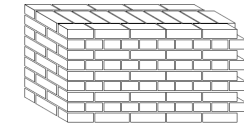
English bond



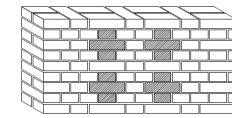
heading bond



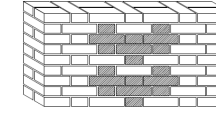
crossbond



wider walls



Dutch bond

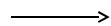


Flamish (Polish) bond

Carpentry

Material

- timber
- glued laminated timber (GLT)
- cross laminated timber (CLT)
- plywood
- etc.



technology



Carpentry

Structure types

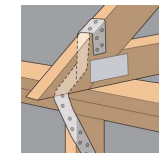
traditional structure

- timber (rafters, beams, planks, battens)
- traditional timber joints (+wrought iron)
- in-situ (on site)



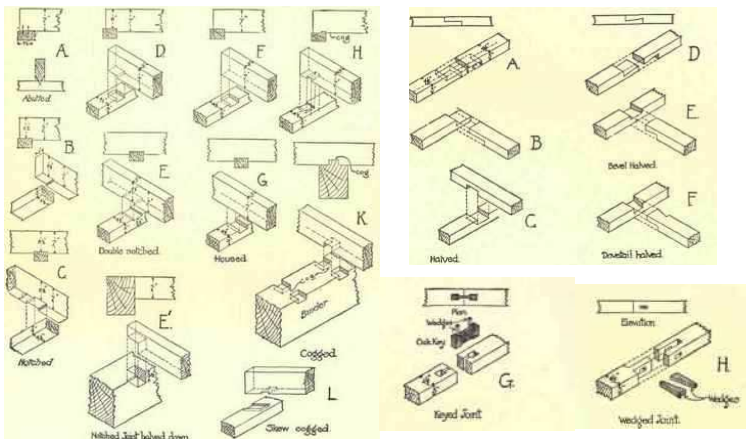
modern structures

- different materials (timber and/or modern ones)
- different joints – mainly with screws, nails, metal sheets, etc.
- partially or totally prefabricated



Carpentry

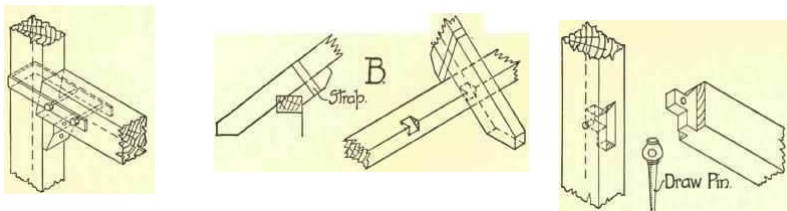
Traditional - joints



notched, double notched, housed, cogged, saw cogged, halved, bevelled halved, dovetailed halved, keyed, wedged

Carpentry

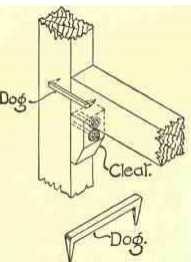
Traditional – advanced joints



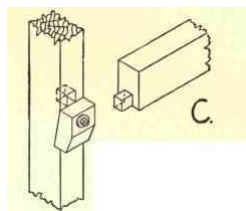
cleated (with strap)

mounted with metal (wrought iron) elements

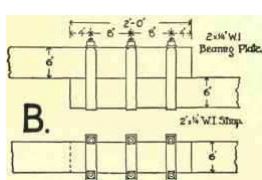
tusk tenoned



cleated (with dog)



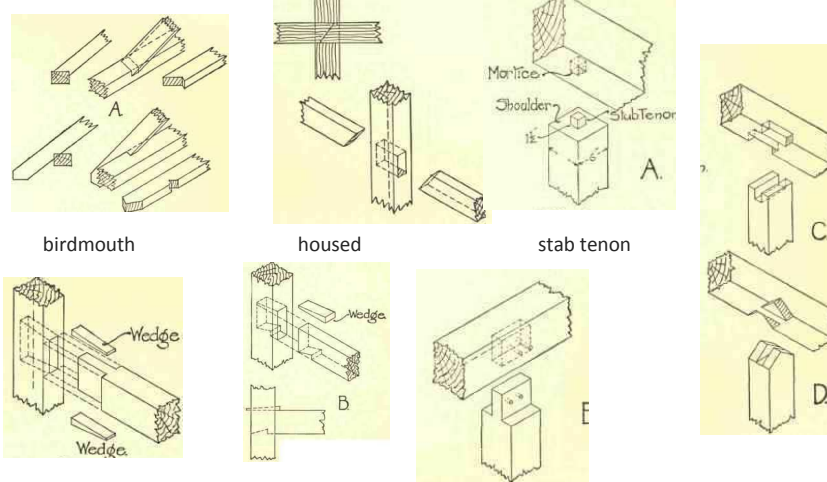
cleated (with stub tenon)



strapped, lapped

Carpentry

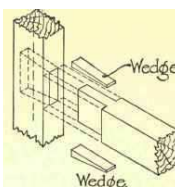
Traditional - joints



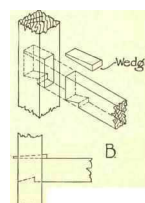
birdmouth

housed

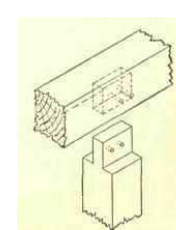
stab tenon



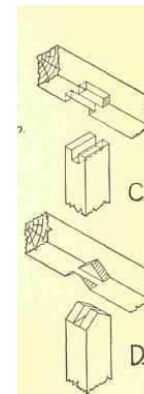
wedged tenon



wedged



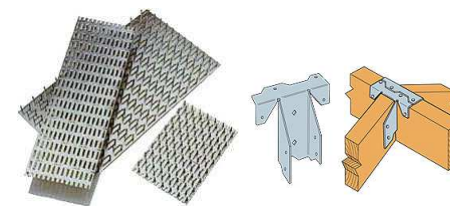
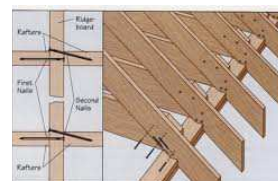
tenon- mortised



bridled

Carpentry

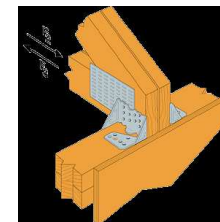
Modern joints



gang nail plates



posi-struts

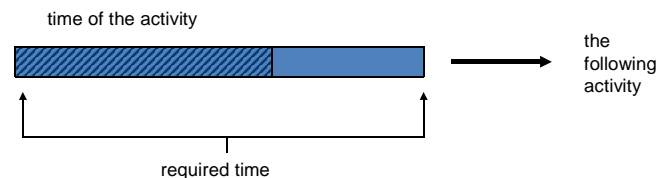


WORK ACTIVITY

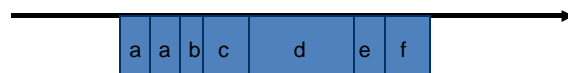
DEF: Basic element of the construction. Closed technological interval.

- during an unbroken interval
- one trade
- at the same place

The time of the construction activity



Time-sequence of the construction works



of a certain construction

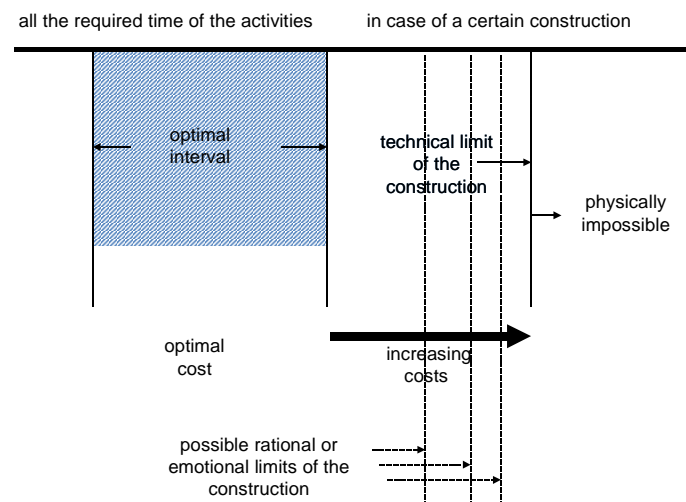
depends on various things – there are many possibilities

IMPORTANT = the technical feasibility of the sequence

- | | |
|---|-------------------------------------|
| interior plaster – fitting windows – exterior plaster | <input checked="" type="checkbox"/> |
| fitting windows – exterior plaster – interior plaster | <input checked="" type="checkbox"/> |
| exterior plaster – fitting windows – interior plaster | <input checked="" type="checkbox"/> |
| interior plaster – exterior plaster – fitting windows | <input type="checkbox"/> |

DEF.: TIME SEQUENCE = The right order of the activities.

Total time of the construction



<http://www.peri-usa.com/products.cfm> 2010-10-26

http://en.wikipedia.org/wiki/Autoclaved_aerated_concrete 2010-10-26

http://www.xella.co.uk/html/gbr/en/ytong_news.php 2010-10-26

<http://www.wienerberger.hu> 2010-10-26

Smiths C. R. – Anders K. C.: Principals and practices of heavy construction, Prentice-Hall, Englewood Cliffs, New Jersey, 1986. p.401

Ambrose, James: Building Construction. Enclosure System. New York, Van Nostard