

IN-SITU REINFORCED CONCRETE

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In-situ reinforced concrete

□ Basic elements of the technology

- Formwork
- Concrete
- Reinforcement

Site planning

Transportation

Preparation/treating

Storing

Scheduling



In-situ reinforced concrete

□ Basic elements



In-situ reinforced concrete

□ Basic steps of technology

1. Checking the structures existing/done before and site
2. Layout of the planned structure
3. Preparation of the formwork (concrete, reinforcement)
4. Assembling the formwork
5. Placing the reinforcement
6. Placing the concrete
7. Consolidating and curing the concrete
8. Disassembling of the formwork (striking)
9. Removing props (horizontal structures)

Elements

Formwork

- Vertical formworks
 - Framed formwork (panel formwork)
 - Timber-beam formwork
 - Special elements, e.g. column formwork
- Slab formworks
 - Panel formwork
 - Timber-beam formwork
 - Special formwork systems, e.g. drophead system, table system
- Special formworks
 - Climbing-, gliding-, tunnel- formw., fair-faced concrete



Formwork

- Vertical formworks
 - ▣ One-sided / Two sided wall formwork
 - ▣ Framed formwork (panel formwork)
 - Heavy weight
 - Light weight
 - ▣ Timber-beam formwork
 - ▣ Column formwork



Formwork

- Slab formworks
 - ▣ Panel formwork (light / heavy)
 - ▣ Timber-beam formwork
 - ▣ Drophead system
 - ▣ Table system



Concrete

- **Material:**
 - Binder material, usually Portland Cement
 - Water
 - Aggregate, e.g. sand, gravel or crushed stone
 - Admixtures, e.g. accelerators, retarders, pigments, pumping aids
- **Characteristics**
 - Consistency, setting time...
 - Strength, loadbearing capacity
 - Spec. characteristics, e.g. colour
- **Mixing concrete:**
 - Ready-mixed concrete (off site);
 - On-site mixing



Reinforcement

- **Traditional reinforced concrete**
 - Steel – reinforcing bars, mesh – cut, bent and assembled
 - Size:
 - length 6m (12m),
 - diameter 6mm-,
 - mesh 5x2,15m
- **Special reinforcement**
 - Pre-stressed reinforcement
 - Steel/plastic/glass fibres
 - Special materials, e.g. bamboo, hemp...



Site planning

Transportation

- To the site
 - Formwork, reinforcing bars: trucks
 - Components of the concrete: trucks or silos
 - Ready-mixed concrete: mixer trucks



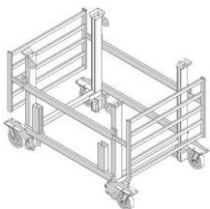
Transportation

- On site – Placing concrete:
 - ▣ Buckets;
 - ▣ Hand / power buggies, wheelbarrows;
 - ▣ Chutes and drop pipes;
 - ▣ Belt conveyors;
 - ▣ Concrete pumps



Transportation

- On site – formwork and reinforcement
 - ▣ Hand / power buggies: timber-beam formwork parts, elements of reinforcement
 - ▣ Crane: panel formwork, pre-assembled formworks, assembled reinforcement



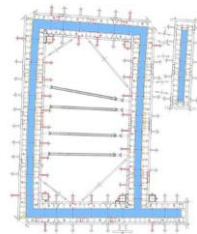
Transportation

- On site Tower-crane



Preparation/treating

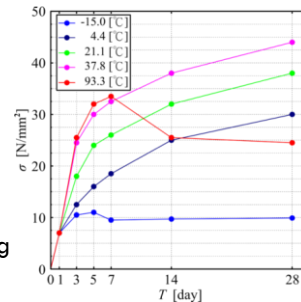
- Formwork – before using
 - (Planning the formwork)
 - Spraying release agent on the facing
 - Preparation of supplemental elements (size adjustment)
 - Pre-assembly of the formwork
- After using
 - Removing supplemental elements
 - Cleaning all surfaces (water!)
 - Disassembly to transportable size



Preparation/treating

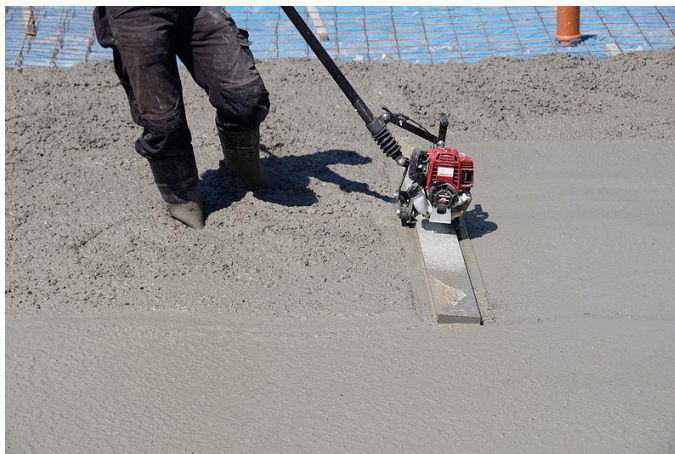
□ Concrete

- Receiving concrete: checking quality certificate
- Problem sources before placing: over-mixing, adding water
- After placing: consolidating (removing bubbles by vibrating or self-consolidating concrete)
- Curing = keeping concrete under controlled temperature and humidity, e.g. spraying/sprinkling water, covering with PE sheets, spraying a plastic membrane
- Setting, hardening, drying...



Preparation/treating

□ Concrete



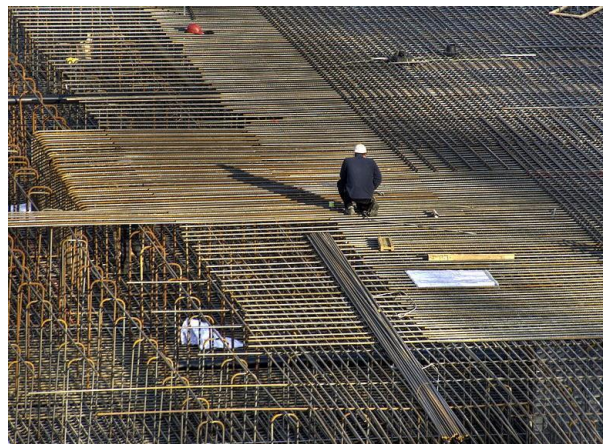
Preparation/treating

- Reinforcement
 - ▣ Cutting, bending, assembly
 - ▣ In factory/on site –
12 m long place required!



Preparation/treating

- Reinforcement



Storing

- Formwork?
 - ▣ Supplemental/not used parts
- Concrete?
 - ▣ Mixer-trucks, bucket, pump
- Reinforcement
 - ▣ Raw material in rolls/bars



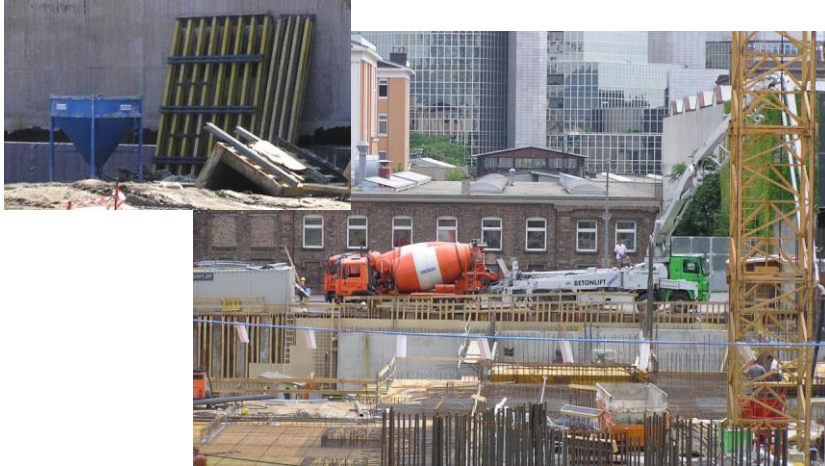
Storing

- Formwork



Storing

□ Concrete



Storing



Storing

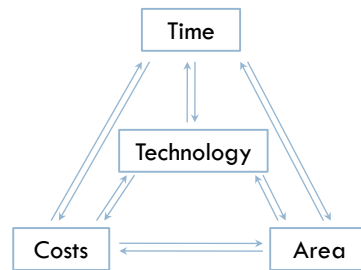


Scheduling

Scheduling RC work

Information needed

- What to do?
 - ▣ Quality and quantity –
formwork area, surface,
concrete and reinforcement
volume
- How to do it?
 - ▣ Technology – formwork
 - ▣ Type of labour (trades)
 - ▣ Type of machine, equipment
- Costs?



Scheduling RC work

Main steps

- Walls, pillars
 - ▣ Assembling formwork (one side)
 - ▣ Placing reinforcement
 - ▣ Assembling formwork (other side)
 - ▣ Placing concrete
 - ▣ Disassembling formwork

Time to set
- Slabs, stairs
 - ▣ Assembling formwork
 - ▣ Placing reinforcement
 - ▣ Placing concrete
 - ▣ Disassembling formwork

Time to set

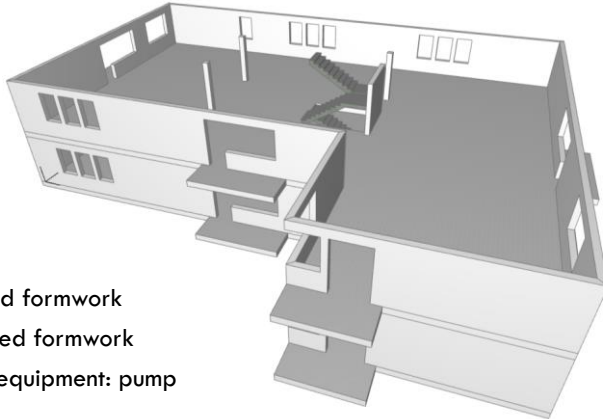
Scheduling RC work

Quantity

- ▣ Slab: 480m²
- ▣ Wall: 297m²
- ▣ Pillars: 3pcs

Technology

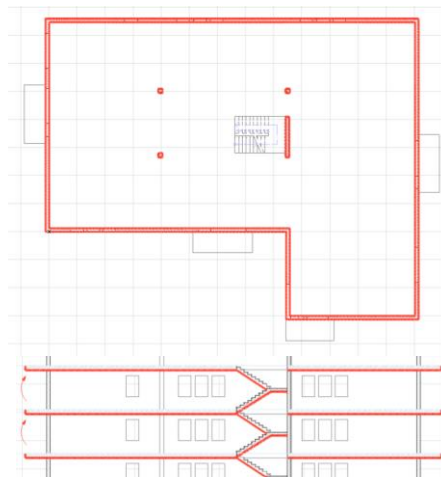
- ▣ Slab: framed formwork
- ▣ Walls: framed formwork
- ▣ Concreting equipment: pump



Scheduling RC work

RC work

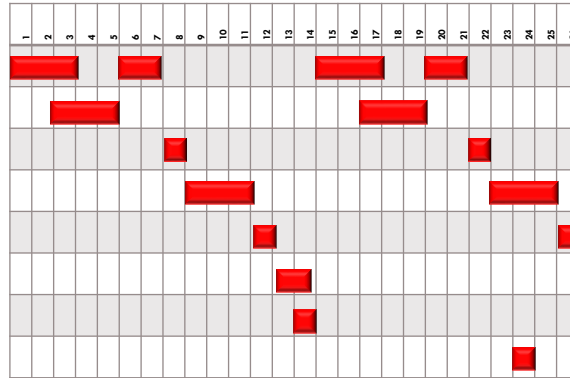
- ▣ Assembling formwork W
- ▣ Placing reinforcement W
- ▣ Placing concrete W
- ▣ Disassembling formwork W
- ▣ Assembling formwork S
- ▣ Placing reinforcement S
- ▣ Placing concrete S
- ▣ Disassembling formwork S



Scheduling RC work

RC work

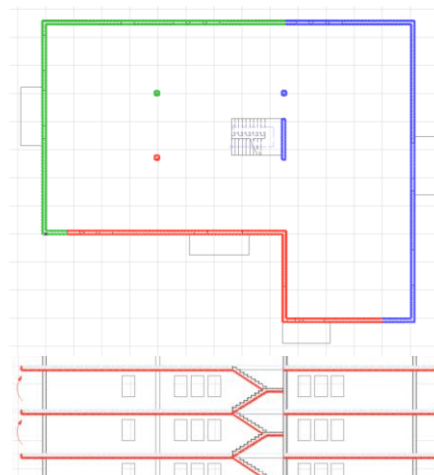
- ▣ Ass. formwork W
- ▣ Reinforcement W
- ▣ Concrete W
- ▣ Dis. formwork W
- ▣ Ass. formwork S
- ▣ Reinforcement S
- ▣ Concrete S
- ▣ Dis. formwork S



Scheduling RC work

RC work

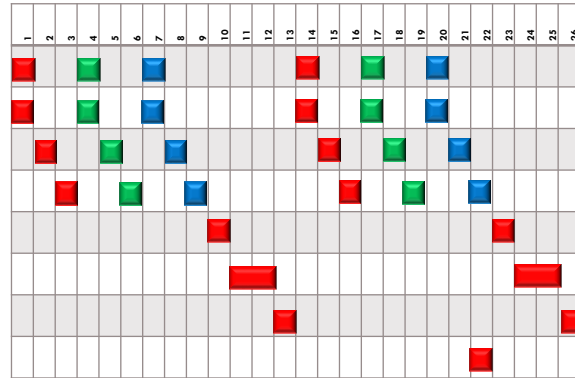
- ▣ Assembling formwork W
- ▣ Placing reinforcement W
- ▣ Placing concrete W
- ▣ Disassembling formwork W
- ▣ Assembling formwork S
- ▣ Placing reinforcement S
- ▣ Placing concrete S
- ▣ Disassembling formwork S



Scheduling RC work

RC work

- ▣ Ass. formwork W
- ▣ Reinforcement W
- ▣ Concrete W
- ▣ Dis. formwork W
- ▣ Ass. formwork S
- ▣ Reinforcement S
- ▣ Concrete S
- ▣ Dis. formwork S



Scheduling RC work

RC work

- ▣ Assembling formwork W
- ▣ Placing reinforcement W
- ▣ Placing concrete W
- ▣ Disassembling formwork W
- ▣ Assembling formwork S
- ▣ Placing reinforcement S
- ▣ Placing concrete S
- ▣ Disassembling formwork S

