APPLYING 5D ON CONSTRUCTION PROJECTS

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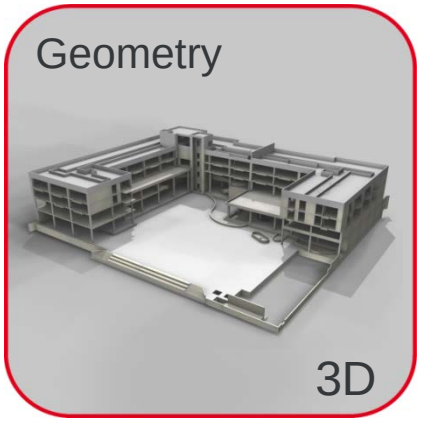
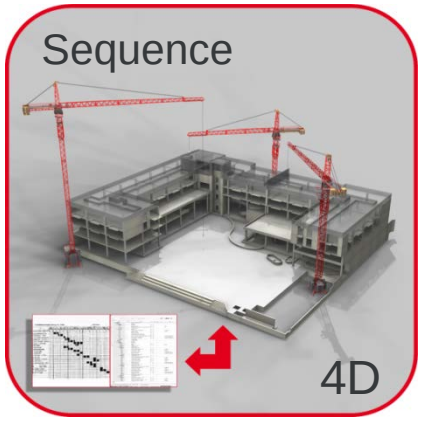
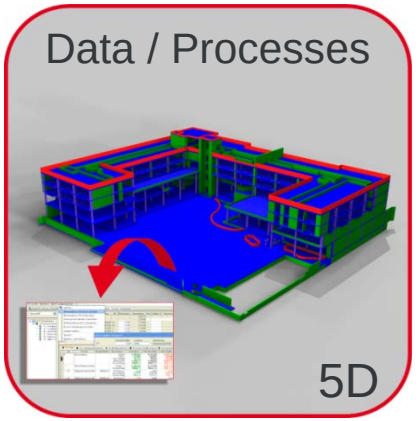
ZÜBLIN

5D – ZÜBLIN'S DEFINITION







One continuously augmented data set

What you see is what you build

Product information model

- Object-based 3D-model with user-defined attributes

What you see is when you build what

Virtual construction site

- Construction sequencing by linking the geometric model to a schedule
- Dynamic construction process
- „Virtual mock up"-simulations

What you see is how you build it

Data- & process management

- Quantity take-off from the 3D-model
- Company-wide logistics
- Connecting all business processes to the 3D-model and the workflow

5D/BIM SHOULD BE APPLIED WHEN…

…the client requires it.

If so, …

- …he might make design models available (means he is serious about it!);
- …he might include BIM requirements in tender documents, e.g.

  - Drawings must derive directly from models;
  - Models shall be used in consistency control, trade coordination and clash detection process;
  - Models shall reflect the level of development relevant for each stage of the design;
  - Construction schedules shall be simulated model-based (4D);
  - Quantities and other data extracts must derive from the models;
  - As-built documentation shall contain as-built models;
  - …

5D/BIM SHOULD BE APPLIED WHEN…

…the internal processes and the communication with the client could be improved.

- Presentation of STRABAG|ZÜBLIN solutions in the tender phase
- Coordination of trades in an early design phase
- Coordination of external planners to develop a high-end models suitable for further process integration and decision support
- Quality checks and augmentations of external models for follow-up processes
- Clash detection and the coordination of subsequent resultant amendments
- Fast and reliable design of complex structures
- Depicting the construction process by connecting the 3D-model and the schedule
- Clash detection of moving parts
- Preparation of site instructions for various construction methods
- Model-based quantity take-off and cost estimation
- Model-based quantity take-off for logistics
- As-built model for facility management
- Design to production; 3D-model for “computer aided manufacturing” (CAM)
- …

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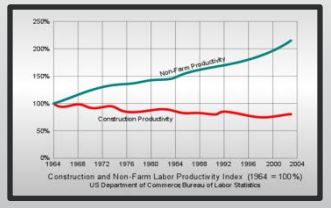
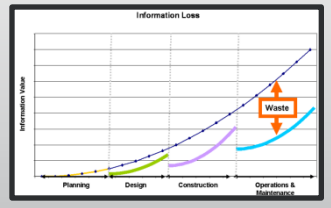
A lot of text, but seriously, there are many possible BIM uses!

PROCESS INTEGRATION…

Origin of process integration problem:



Loss of productivity



Loss of information

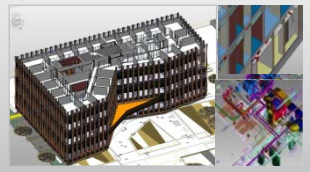
Fragmentation

Solution:

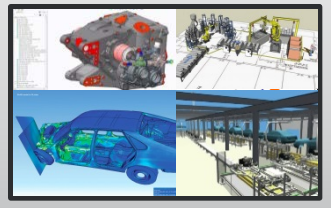
Holistic View
→ Process Integration

Means:

3D/BIM
5D

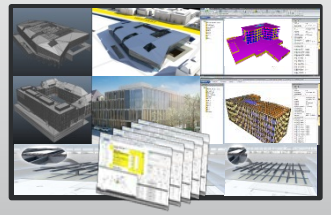


Implementation:



Mechanical Ind.

Strategy Constr. Ind.

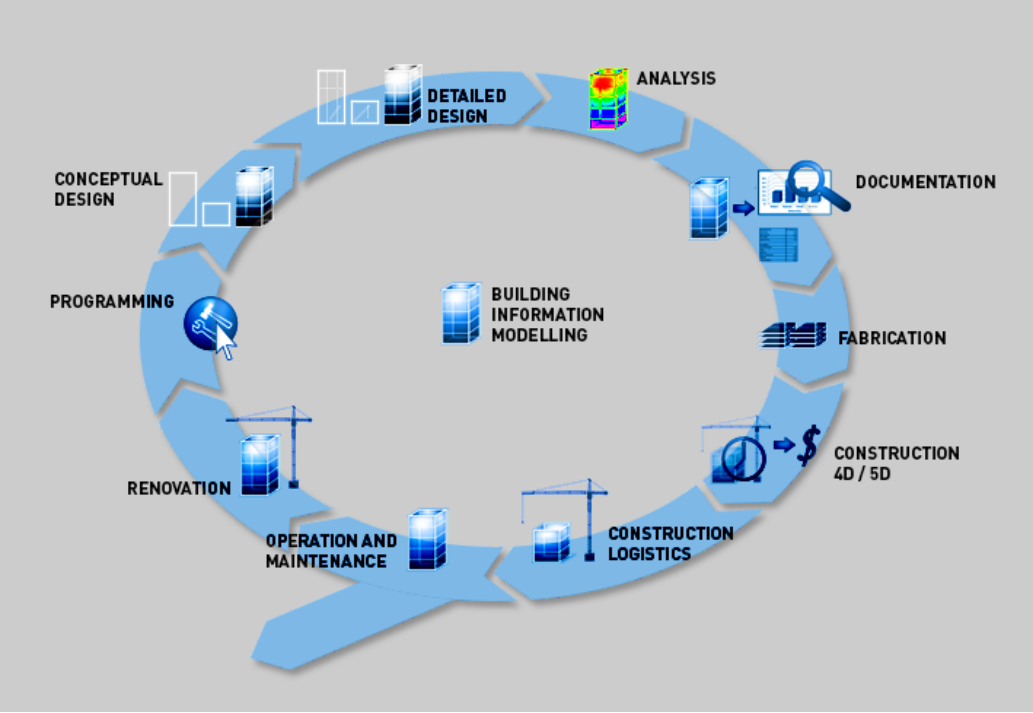


Status Quo

PROCESS INTEGRATION…

3D/BIM is only the beginning

- Mechanical industry gained substantial advantages from PLM systems
- PLM in construction industry means **5D**: linkage of BIM and process



We need to get from 3D/BIM product information models to process oriented 5D models

Implementation

- is an industry challenge, not an initiative of individual companies,
- needs to yield incremental benefits,
- cannot be copied from mechanical industry.

…AND COMMUNICATION → VISUALIZATION

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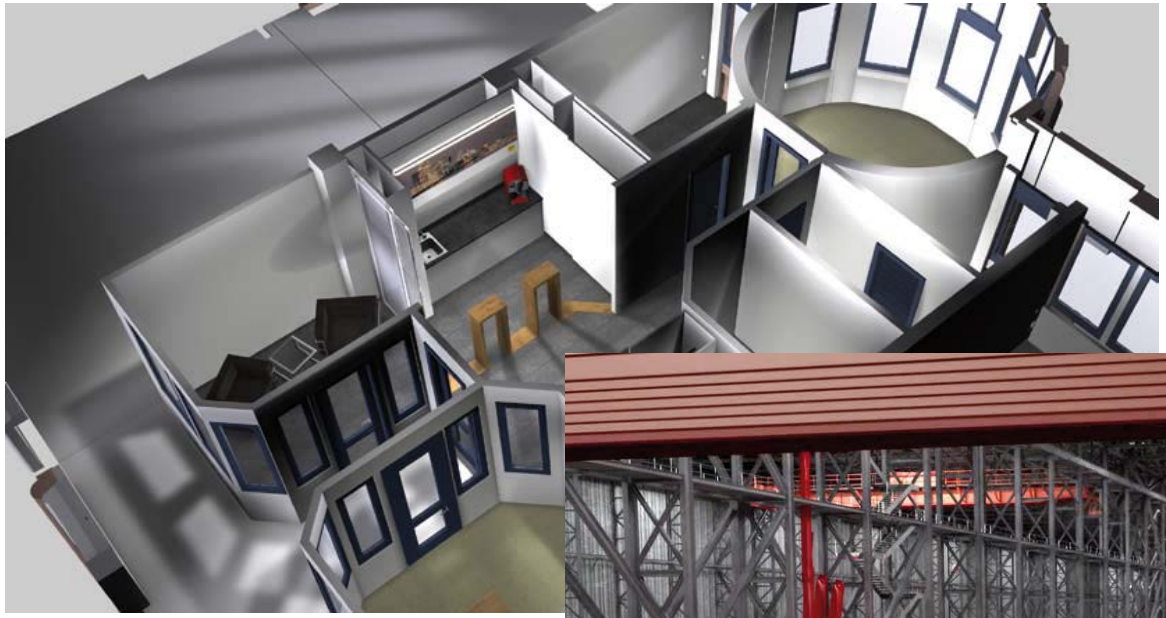

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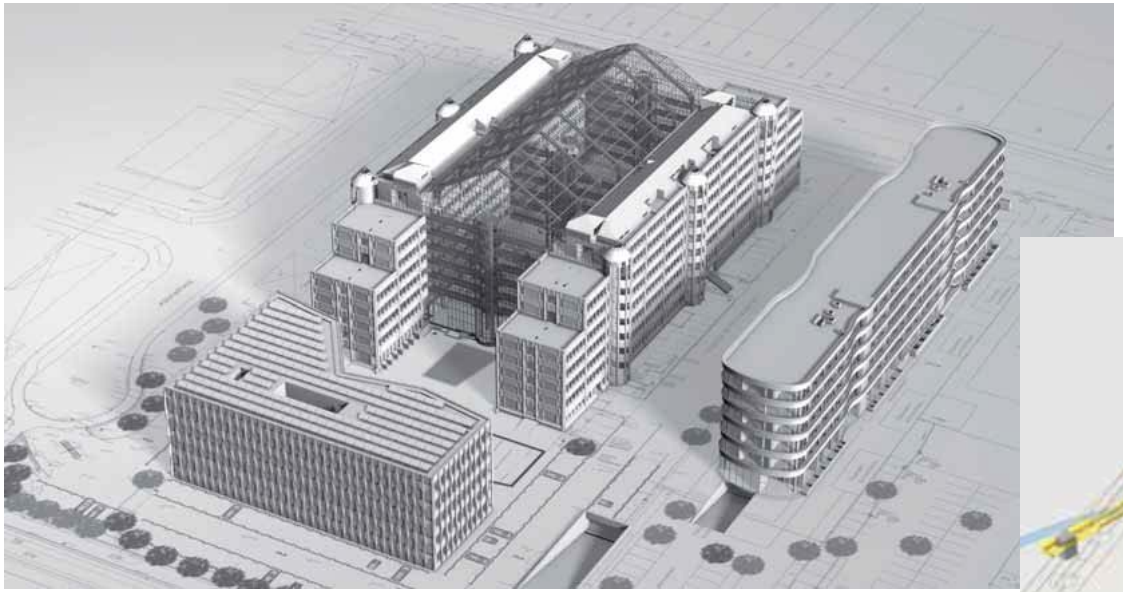
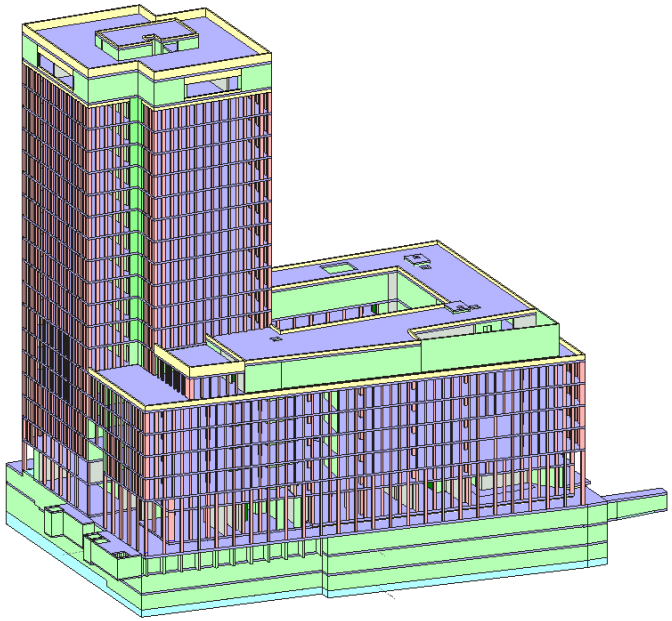
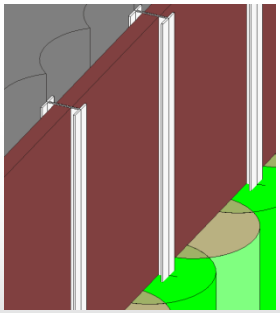
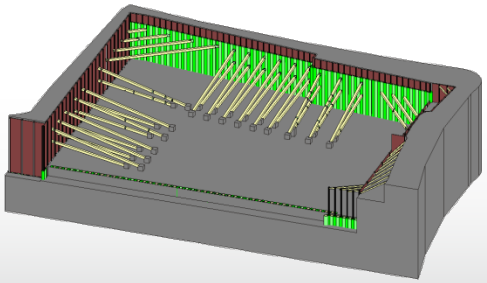


“MainTor Porta”, Frankfurt

Modeling
Quantities
4D Planning
Visualization

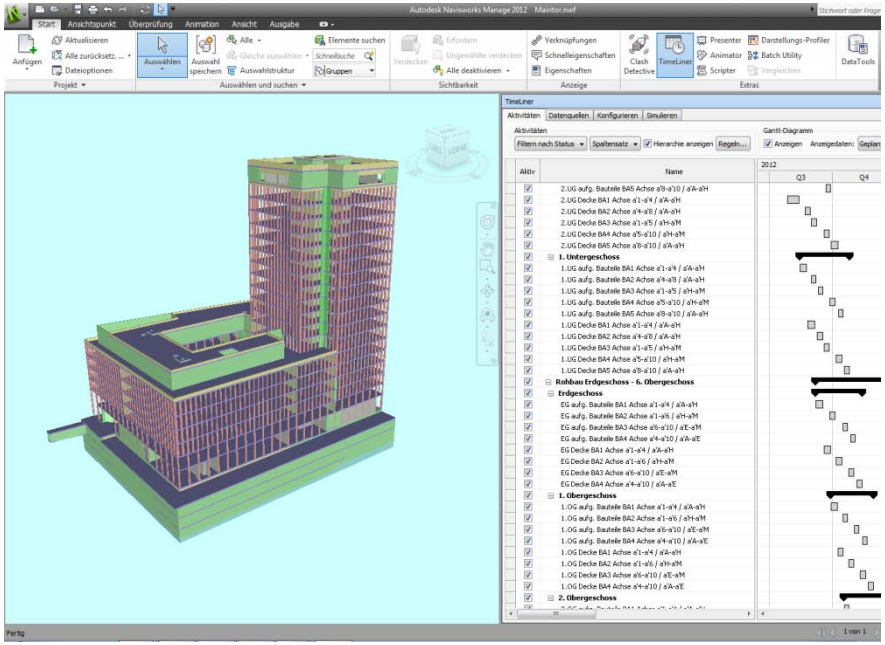






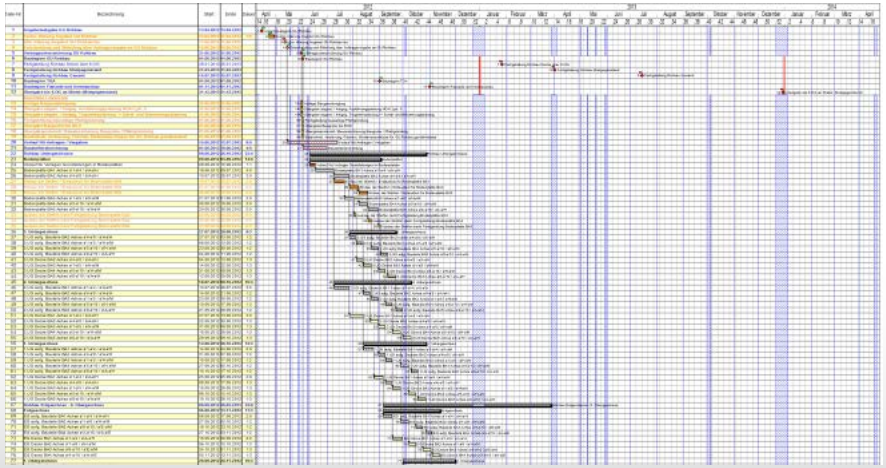
Source: Wikipedia

“MainTor Porta”, Frankfurt



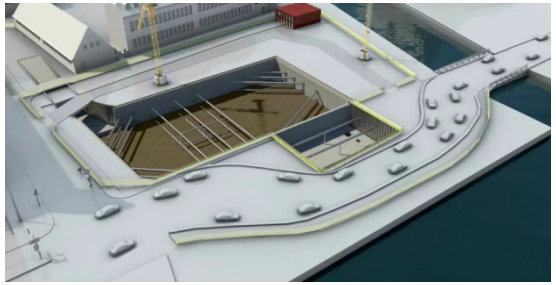
4D Planning

- Definition of element codes in the model and in the schedule
- Automatic rule-based linking of the model to the schedule

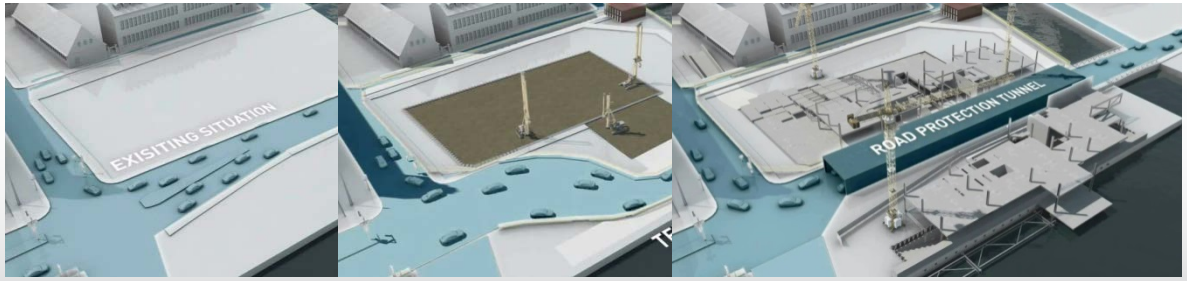


“Bryghus Projektet”, Copenhagen

Client’s model



Additional modeling:
Excavation pit
Site facilities
Traffic routing
Sustainability



“Roche Tower”, Basel

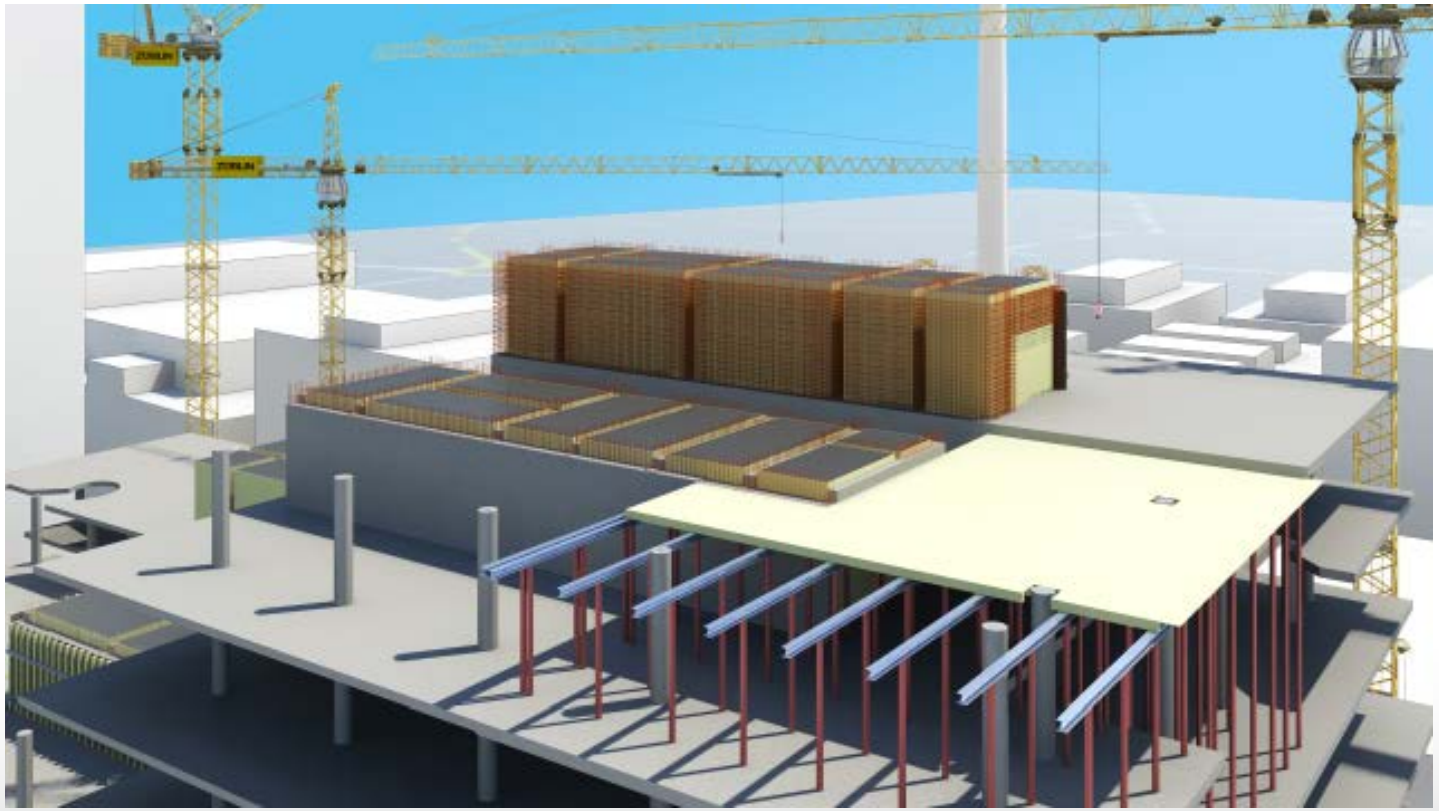
Site layout

- Very limited space
- Logistics concept

“Roche Tower”, Basel

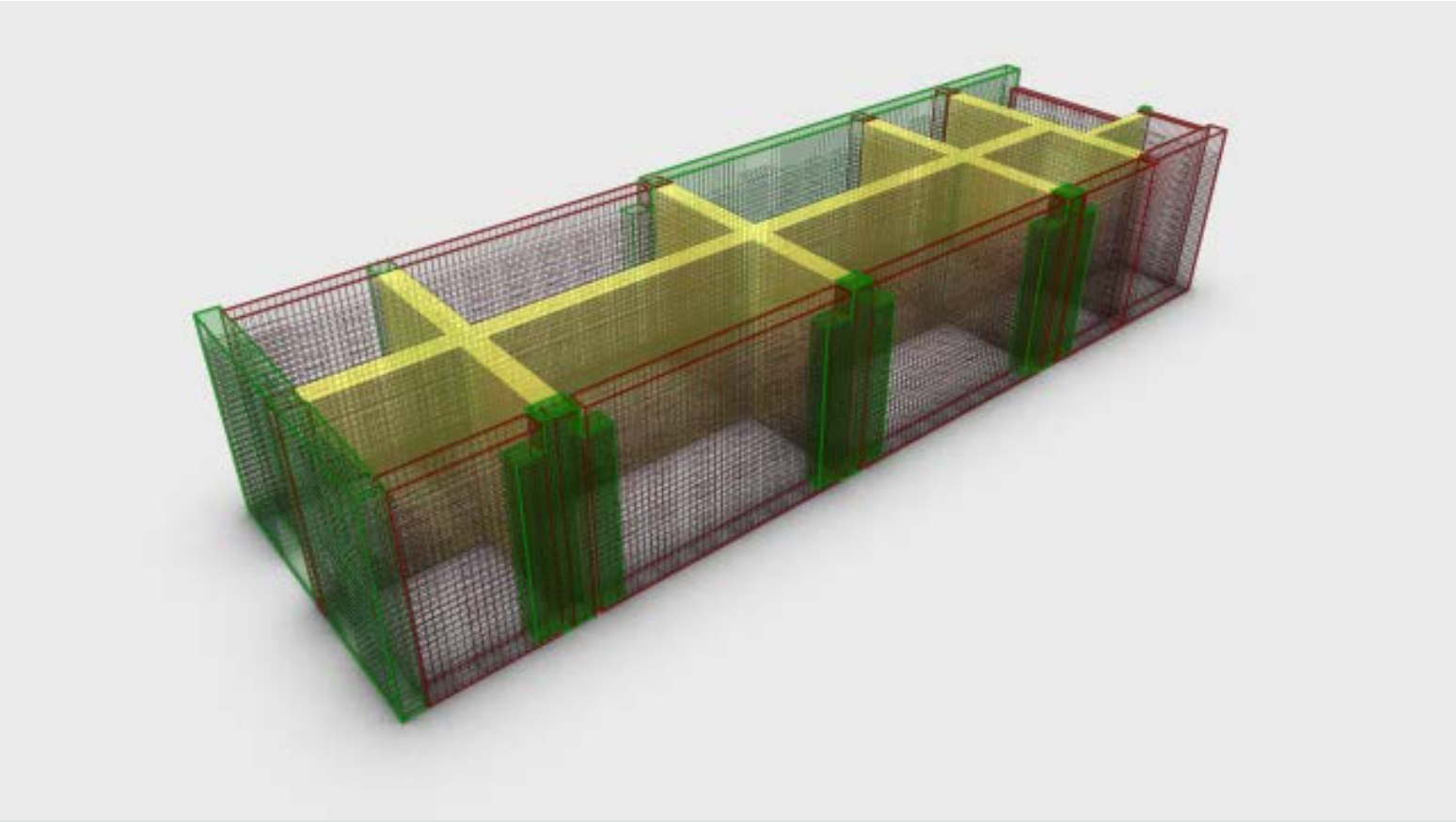
Detailed 4D-modeling

- Formwork, reinforcement, pouring of concrete



“Roche Tower”, Basel

Reinforcement: detailed sequence



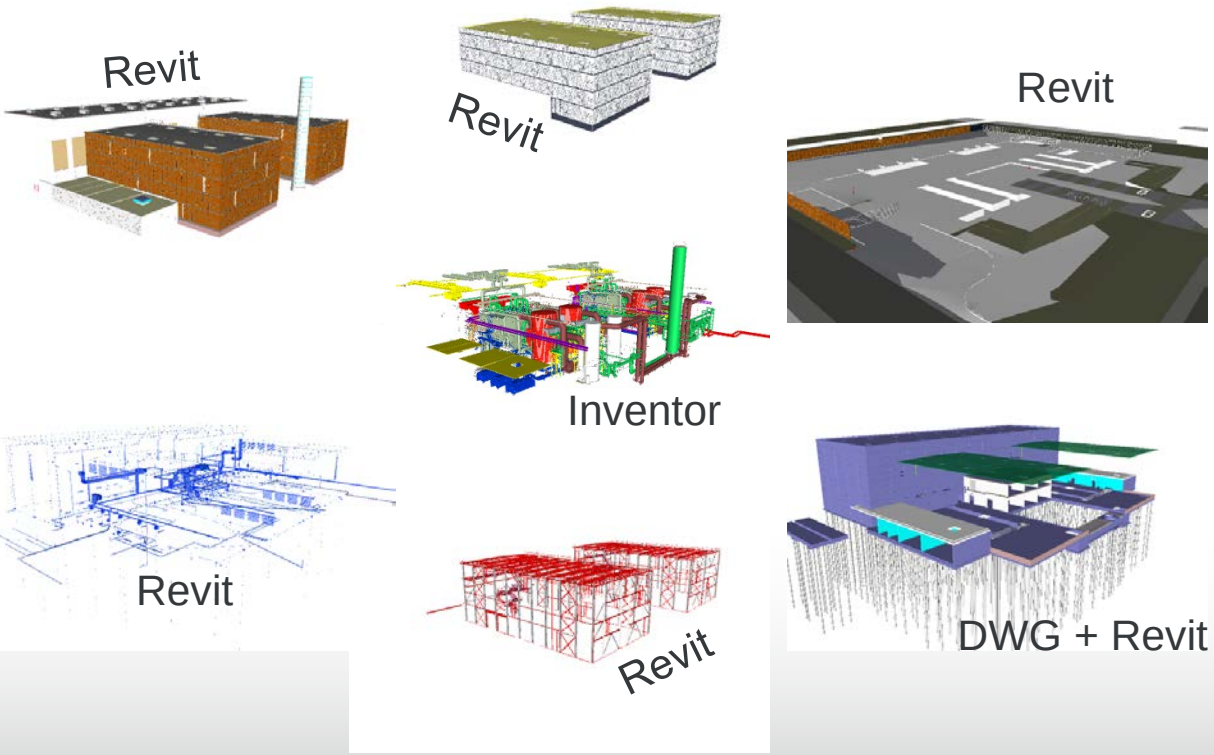
Bioenergy Power Plant Purmerend

BIM coordination in construction phase

- Weekly compilation of coordination model and regular clash detection runs
- 2D → 3D → 2D support for structural engineering

Partial models:

- Architecture
- Façade
- Site
- Structure
  - Concrete
  - Steel
- MEP installations
- Plant installations



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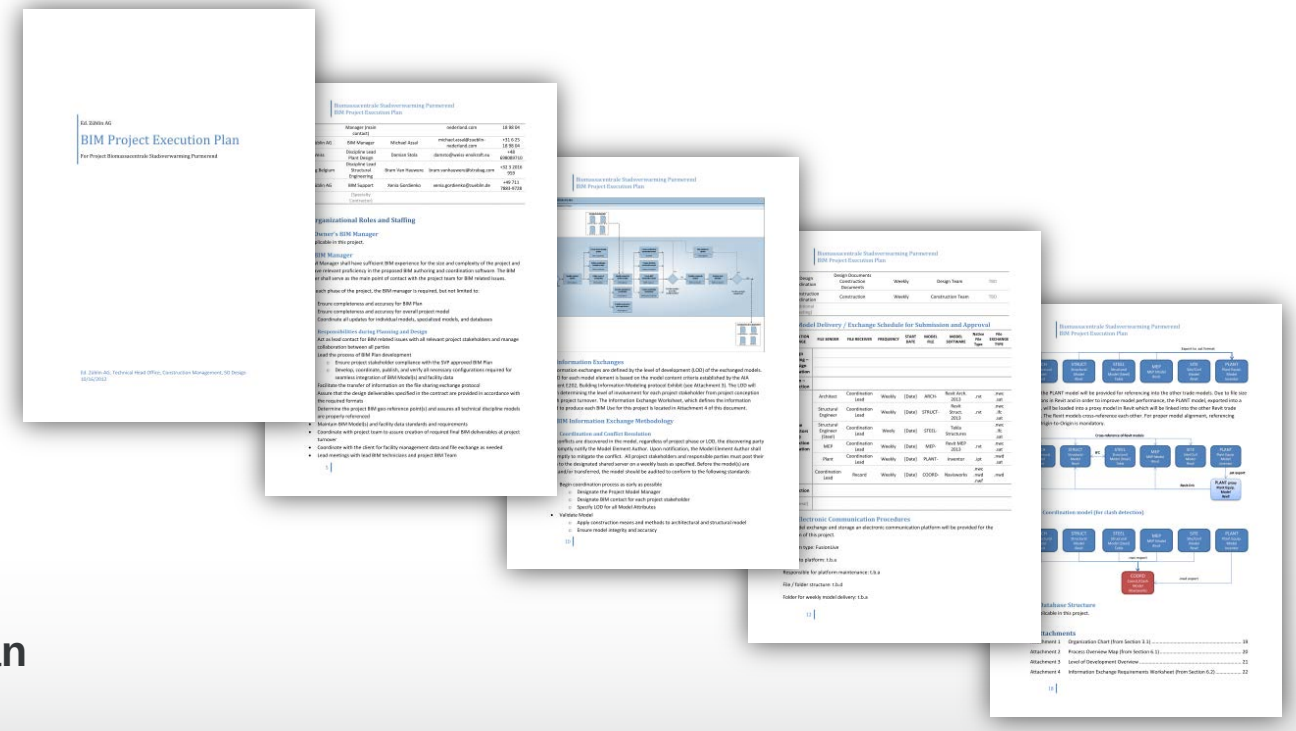
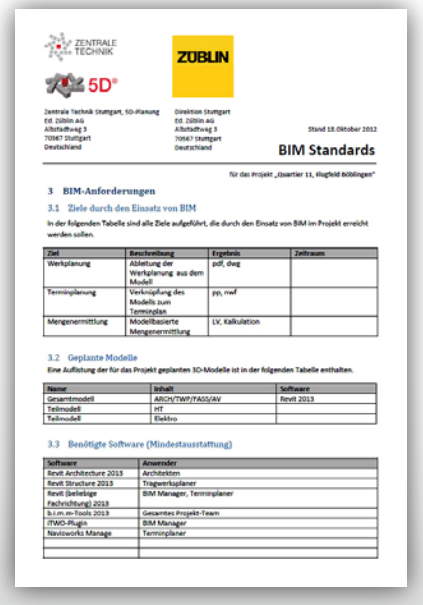
BIM project execution plan



Quartier 11, Flugfeld Böblingen

BIM coordination in construction phase

- BIM project execution plan
- Revit-Server infrastructure for collaboration of Architect, Structural Engineer, General Contractor
- Regular compilation of coordination model and clash detection runs: Arch., Struct., Electr., HVAC, Sprinkler



ZENTRALE TECHNIK

5D®

ZÜBLIN

Zentrale Technik Stuttgart, 5D-Planung
Ed. Züblin AG
Albstadtweg 3
70567 Stuttgart
Deutschland

Direktion Stuttgart
Ed. Züblin AG
Albstadtweg 3
70567 Stuttgart
Deutschland

Stand 18.Oktober 2012

BIM Standards

für das Projekt „Quartier 11, Flugfeld Böblingen"

3 BIM-Anforderungen

3.1 Ziele durch den Einsatz von BIM

In der folgenden Tabelle sind alle Ziele aufgeführt, die durch den Einsatz von BIM im Projekt erreicht werden sollen.

Ziel	Beschreibung	Ergebnis	Zeitraum
Werkplanung	Ableitung der Werkplanung aus dem Modell	pdf, dwg	
Terminplanung	Verknüpfung des Modells zum Terminplan	ppj, nwf	
Mengenermittlung	Modellbasierte Mengenermittlung	LV, Kalkulation	

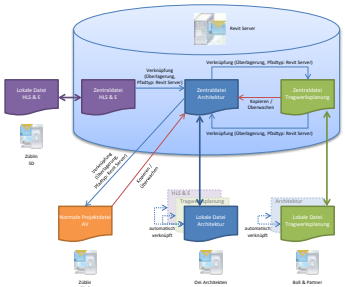
3.2 Geplante Modelle

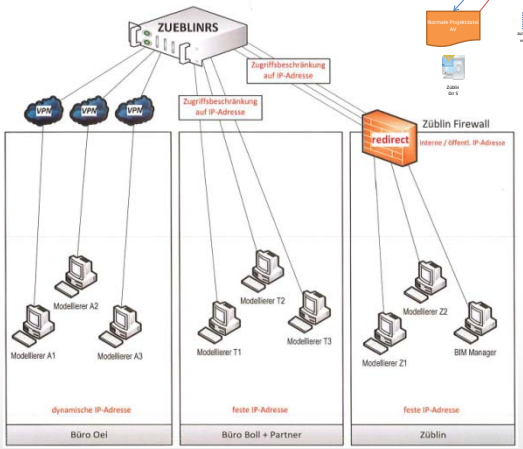
Eine Auflistung der für das Projekt geplanten 3D-Modelle ist in der folgenden Tabelle enthalten.

Name	Inhalt	Software
Gesamtmodell	ARCH/TWP/FASS/AV	Revit 2013
Teilmodell	HT	
Teilmodell	Elektro	

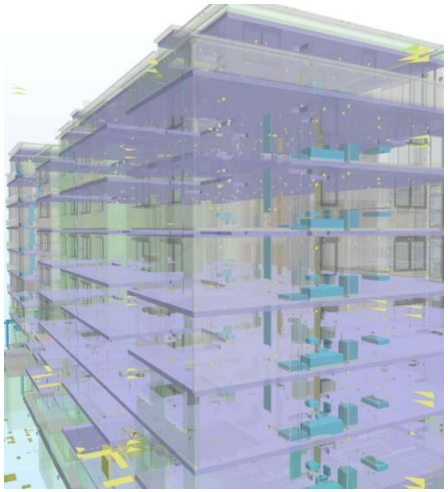
3.3 Benötigte Software (Mindestausstattung)

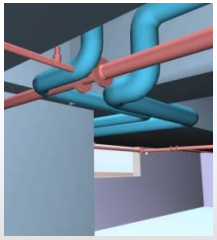
Software	Anwender
Revit Architecture 2013	Architekten
Revit Structure 2013	Tragwerksplaner
Revit (beliebige Fachrichtung) 2013	BIM Manager, Terminplaner
b.i.m.w-Tools 2013	Gesamtes Projekt-Team
iTWO-Plugin	BIM Manager
Navisworks Manage	Terminplaner

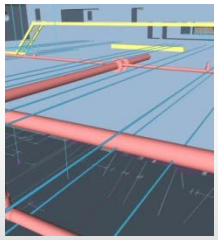




Source: N+P Informationssysteme GmbH







DISCUSSION

ZÜBLIN