

# Lake Constance 5D-Conference 2016





Source: Siemens

# Holistic Model-based Collaboration in Designing and Constructing a Power Plant Project

Markus Rambach, Julius Berger International GmbH, Wiesbaden/Germany



# Agenda



- Stakeholders and project
- BIM/5D organization
- BIM execution plan
- Examples of collaboration
- Lessons learned
- Way forward



**Project Organization** 

**Stakeholders** 

# **SIEMENS B**JULIUS BERGER





**JBI is BIM Manager** 





### **Julius Berger International GmbH**

- Engineering company located in Wiesbaden/Germany
  - Integrated design and engineering
  - Consulting and more services
- Formed out of Bilfinger Berger Nigeria GmbH in May 2012
- Key member of the Julius Berger Group
- Nearly 120 years of worldwide experience

   since 1965 especially large-scale projects in Nigeria
- Strong executional knowhow due to close involvement with job sites
- Business segments
  - Industry
  - Infrastructure
  - Buildings







Status: December 2015















# **Buildings – Areas of Expertise**

- All design phases
- Architectural design
- Structural design
- MEP services
- Sustainability design
- Procurement
- Project development













# **Design & Engineering**

#### Infrastructure – Areas of Expertise

- Master plan concepts
- Traffic infrastructure planning
- Planning of residential areas and urban districts
- Bridge design
- Planning of water supply, sewage and drainage systems
- Rain and wastewater management
- Utility and telecommunication concepts
- Technical optimisation (value analysis/value engineering)













### **Design & Engineering**

### Industry – Areas of Expertise

- All design phases
- Architectural design
- Structural design
- Drainage and sewage design
- Logistics planning
- Concepts for solutions in steel and reinforced concrete
- Analysis of constructability
- Sustainability design
- Project development

5Dinitiativ











# 5D Approach to Design & Construction Projects at Julius Berger

- Accomplish added value in the entire project workflow (design and construction)
- Modeling with links to all project stakeholders (incl. clients, their designers and consultants, our subcontractors and vendors) if possible and if it makes sense
- Gain experience and knowledge with selected projects (tender and execution phase)
- Develop with a BIM team and teach staff on projects
- Seek "quick wins" for the entire project life cycle in the company ("easy tools").





#### **BIM in the Project Life Cycle**







**5D Approach** 

#### **5D Success Components**











**5D Approach** 

#### **Software Tools for 5D Works**







### **BIM Status at Julius Berger**

- More than 25 model-based building projects executed
- Several projects from design to execution (structural, architectural, MEP)
- Multiple building projects in design phase (structural, architectural, some MEP)
- Infrastructure projects with hydraulic design
- Development of own content
- Fourth dimension mainly for construction sequence and visualisation
- Modelled site installation
- Implementation of equipment models (e.g. tower cranes).





#### **Introduction to the Project**

- Power plant
- Electrical generating capacity > 400 MW
- Consortium is EPC contractor
- Start of construction: 2016
- Scope of works:
  - Plant
  - Structural
  - Civil
  - Buildings.







# Model from Mole to Bird's Eye View







# A Flight around the Plant











# Why a BEP?

- More than one person. More than one discipline. More than one project phase. More than...
- Ground rules for works to ensure maximum of benefits
- Basis:



	BIM-Leitfaden für Deutschland			
Information und Ratgeber				
	Endbericht			
Forsehungspro	Of Taxate			
ZukunttBAU,				
ein Forschungsp	rogramm des Bundesministeriums für Verkehr, Bau und Stadtentwicklung (EM/VBS)			
Projektlaufzeit				
1. Dezember 201	2 bis 30. November 2013			
Aldersteinheit				
10.08.177-12.0	8			
im Auftrag				
des Bundesinstitu	ats für Bau-, Stadt- und Raumforschung (BBSR)			
en bundesamt ru	r Dauwesen und Kaumentwicklung (DDK)			
bearbeitet von				
Martin Egger, CE	ERMEYER Flanen+Beraten, Munchen			
Kerstin Hauskner	cht, AEC3 Deutschland Grobil, München AEC3 Deutschland Cerklif, München			
Jakob Przybyło, I	OBERMEYER Planen+Beraten, Munchen			





### **Essential Topics of the BEP**

Project Coordination Model

Model Collaboration with Clash Analysis

• Quantity Take-Offs.





### **Data Input to Coordination Model**





# **Data Exchange Overview**

Sender	Recipient	Content	File Format
Siemens	Julius Berger	Plant Design	RVM, NWC
Siemens	Julius Berger	Electrical Design	RVM, NWC
Siemens	Fichtner	Basic Plant Design	DWG
Fichtner	Julius Berger	Civil Structures	RVT,IFC
Fichtner	Julius Berger	Steel Structures	IFC
Julius Berger	Fichtner	Infrastructure	DWG, IFC
Julius Berger	Siemens	Infrastructure	DWG, IFC
Julius Berger	Siemens	Buildings	DGN





#### **Connected Models at Start**







# **Site Installation and Camp**







# **Mixing Plant**







# Workshop Building







# **Finishing and MEP Works**







#### **Electrical Works**







# **Clash Analysis**

- Design review
- All disciplines in one spot
- Early involvement of job-site team
- Time intervals for updates
- K.I.S.S.





# **Structural Works of the Main Building**







#### **Collision Checks of Structural Works**







#### **Collision Check of Steelworks and Foundations**







# **Collision Checks of Structural Steel and Piping**







# **Collision Checks of Steel and Piping with Zoom**







#### From BIM Manager's Perspective

- BIM asap
- Policy! Objective?
- Structure  $\leftarrow \rightarrow$  Creativity
- One model manager per stakeholder
- Simplify your project!
- Keep communicating.





# **Visualization Helps**







#### Look Inside the Plant







# Way Forward with BIM/5D on this Project

- More efficiency and effectiveness from the ignited team
- Harvest the low hanging fruits
- Sequence of works
- Diary of works
- Sound basis for project controls and claims.





# Way Forward with BIM/5D on such Projects

- The client does not come up with the 5D idea
- The BIM manager is key
- Inter-disciplinary collaboration saves a lot of money
- There is teamwork with more respect
- Information and integration improves innovation and impacts.





#### Lake Constance 5D-Conference 2016

# Holistic Model-based Collaboration in Designing and Constructing a Power Plant Project



markus.rambach@int.julius-berger.com www.julius-berger-int.com