AU LAS VEGAS 2019

Philippe Testard - Andreas Marschall - Nabil Nougha

Best Practices learned in a Complex Hydroelectric Plant Project

AGENDA

• Presenters, Companies and Introduction
• The Project
• BIM Implementation
• Interoperability
• Dynamo / BIM360
• Wrap-Up

About the Speakers

Testard Philippe – BIM Manager
Vinci Construction Grands Projets

Marschall Andreas – BIM Manager
Andritz Hydro

Nabil Nougha – DSS Enterprise
Customer Success Organization

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What does BIM mean to you?

- Change of mindset (Sharing is Caring)
- Parametric Elements instead of “Just 3D”
- Increasing designer skills
- Formworks drawing the “french way”
- Precast/Rebars need to be developed
- Sub-suppliers often not BIM compliant

Civil

- Software, Software, Software!
- IFC classes not reflecting complete scope
- Concept design critical
- Silo mentality
- Long supply chain
- Cable routing not feasible in Revit
- O&M implementation
- Linking of external information
- Sub-suppliers often not BIM compliant

Electromechanical

The Project

- Presenters and Companies
- BIM Implementation
- Interoperability
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Project Presentation

- Client: Office National de l’Electricité et de l’Eau Potable (ONEE)
- Financing:
  - 25% African Bank of Development
  - 75% European Investment Bank
- Contract: “Turnkey”

Project Location

Scope of Work

1. Upper Basin
2. Penstock Section 1
3. Penstock Section 2 (exposed)
4. Penstock Section 3
5. Powerstation
6. Switchyard
7. Penstock Section 4
8. Lower Basin
Project Overview

Basic BIM Figures

- Number of People Involved in BIM:
  - VCGP Structural Office: 8
  - VCGP Project Team: ~10 (currently)
  - Andritz: ~10
  - MEP: 4
  - Architectural: 2

Number of Issues

Closed Issues
Site by end of April

It's All About Planning!

- Presenters and Companies
- The Project

BIM Implementation
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14.11.2019

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A Lot of Communication / Explanations / Trainings Needed

Coordination Team

Simplified Process
Issue Tracking Platform (BIMTrack®)

Goal:
- Create and follow-up issues
- Traceability of issues
- Coordination KPI’s
- Live reporting
- Cloud based solution
- BCF server

Interoperability
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Presentation Will Focus on...
INTEROPERABILITY
Creating a Federated Model

Challenges:
• Software compatibility
• Geolocation
• Integration of Issue Management Platform
• File size
• Offline availability for site
• Viewing performance

Model Organisation

Workflow Model Exchange
Simplifying Models

Simplifying Models in Inventor

File Size Comparison

13%

30 MB

230 MB

Original Version

Simplified Component

Facts:
weight: ~70 tons
(dimensions: (L x W x H))
7.3 x 5.4 x 7.2m
Ø 1.25m
The Way to Wisdom…

We Have a Problem, Don’t We?

LIES! DECEPTION!!!
Methods To Create 2D Drawings

1. Inserting in generic or Mass families
   - Revit native file => All sectioning available
   - Missing geometry
   - No automatic placement in models
   - Requires family management
   - Generic families (filter to handle visibility of elements needed)

2. Link .sat, export in DWG, reinsert in families
   - All sectioning available
   - File extremely heavy and slow
   - Exporting may crash the computers
   - Requires huge model organization
   - No automatic placement in models
   - Very time consuming

3. Create In-Place Generic Models and Link the .sat File!
3. The Simple Method

<table>
<thead>
<tr>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>View plan sectioning</td>
<td>Limited classification (no mechanical equipment for example)</td>
</tr>
<tr>
<td>Upper plan sectioning</td>
<td>In-place models</td>
</tr>
<tr>
<td>Section plan sectioning</td>
<td></td>
</tr>
<tr>
<td>Automatic placement for others actors</td>
<td></td>
</tr>
</tbody>
</table>

Evolution of Structural model size

Peak due to in Place Models
1. Presenters and Companies
2. The Project
3. BIM Implementation
4. Interoperability

Dynamo / BIM360
- Wrap-Up

Automation | The New Normal
Automation is the Disruptor
- Visual interface to construct logic routines

C++
C# .NET
Python

Interactive Tools
Pencil + Clay

Models Organisation
- Revit Families Integration Organisation
- Direct integration of .sat files in In-situ models
- Lose of time due to reorganisation
- 2D impacts on drawings
What is Dynamo?

- Dynamo is a visual programming interface made to access the Revit API (Application Programming Interface).
  Programming Languages used to access Revit API are mainly Python & C# but you do not necessarily need to know how to code to use Dynamo.
- Dynamo has been created by Autodesk to allow experienced Revit users to develop their own functions that cannot be achieved directly or easily in Revit.
- Dynamo allows you to write scripts. Scripts are chains of code (block of pulled nodes) linked together that form a specific query.
- Dynamo requires time to understand how nodes work and how to use them. There is a quite strong Dynamo users community at http://dynamobim.org/ with tutorial videos and a forum.

Dynamo to reorganize your models

How to display .sat elements at the beginning?
After reorganisation

The list of filters to create:

Around 70!

Now, create all these filters and assign it to the views and templates that you need please!
If we decompose the sentence:

« Now, create all this filters¹ manually and assign² it to the views and template that you need please ! »

1. Create filter
   - What ?
   - With what ?

2. Assign to the views and template
   - Which views ?
   - Which graphical appearance ?

Make a little Ecosia research and...

BIM 360 PDF Workflows
What is BIM 360?

BIM 360 Comparison tool feedback

- Easy detection of elements that disappeared / changed
- User friendly
- Sometimes unstable => Autodesk support

How to use BIM 360 2D Comparison Tool
Contribution of Autodesk EPS

52 cases

- 24 Direct Solutions
- 8 Enhancement Requests
- 10 Fix planned
- 6 Enhancement Requests (or linked to existing escalations)
- 6 Fix planned (1 fixed in 2019)

The top 3 ways to boost your BIM ROI

- 32% Increase in productivity
- 60% Reduction in errors and rework
- 1 in 3 projects completed within budget
Wrap-Up

- Presenters and Companies
- The Project
- BIM Implementation
- Interoperability

#good
- Better Design
- Improved Communication
- Issue Tracking
- Ecological: Less Physical Meetings!
- Less Travel Time -> More Time to Work!
- Platform Access for Everyone to Check Issues
- Automation of painful and time consuming tasks

#couldbebetter
- Hard to Train People from Abroad
- Software Limitations
- (Global) Understanding of BIM
- BIM≠BIM in Some Cases
- Easier Transfer of Information

#perspectives
- Dynamo knowledge and implementation
- Improve simplification of Equipment
- Training, Education and Certification
- Data Exchange between Software Packages
- Processes for O&M
- Standards ?
  - …